

NEVADA MINING ORAL HISTORY PROJECT

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From oral history interviews
conducted by Victoria Ford
and Lynn Furnis

Edited by Kathleen Coles
and Victoria Ford

University of Nevada
Oral History Program
2008

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CONTENTS

Preface	vii
Introduction	ix
1 Arthur Bernard	1
2 Thomas M. Cahill	37
3 Claude S. Chaplin	85
4 J. Alan Coope	95
5 Donald Duncan	149
6 John Gomes	205
7 William A. Harrigan	265
8 Robert Horton	317
9 C. Warren Hunt	411
10 Victor Kral	425
11 John S. Livermore	521

12	Peter N. Loncar	567
13	Jesus Martinez	633
14	Bill and Blanche Shipley	653
15	Ed Slavin	699
	Glossary	717
	Index	723
	Photo Credits	741

PREFACE

FOUNDED IN 1964, the University of Nevada Oral History Program (UNOHP) records and collects interviews that address significant topics in Nevada's remembered past. The program's chroniclers are primary sources: people who participated in or directly witnessed the events and phenomena that are the subjects of the interviews. Following precedent established by Allan Nevins at Columbia University in 1948, and perpetuated since by academic programs such as ours, these recorded interviews and their transcripts are called oral histories.

This research volume is crafted from the verbatim transcripts of interviews conducted with sixteen chroniclers between 1997 and 2007. Victoria Ford was the interviewer for all of the oral histories except for Claude Chaplin's, which was the last in the series and was conducted by Lynn Furnis. Remaining faithful to the transcript's content, and adhering as closely as possible to the chroniclers' spoken words, the

manuscript was edited for clarity. The editors also gave it chronological and topical organization not always found in the raw transcript. Readers who desire access to the unaltered oral histories are invited to visit the offices of the UNOHP, where the tapes of the interviews may be heard by appointment.

To add context to written representations of the spoken word, the UNOHP uses certain editorial conventions. Laughter is represented with [laughter] at the end of a sentence in which it occurs; and ellipses are used, not to indicate that material has been deleted, but to indicate that a statement has been interrupted or is incomplete . . . or there is a pause for dramatic effect.

As with all of our oral histories, while we can vouch for the authenticity of the oral histories in this volume, we advise the reader to keep in mind that they are personal accounts of a remembered past, and we do not claim that they are entirely free of error. Intelligent readers will approach them with

the same anticipation of discovery, tempered with caution, that they would bring to government reports, diaries, newspaper stories, and other interpretations of historical information.

UNOHP
April 2008

INTRODUCTION

While conducting an oral history study of the Mineral Ridge Mining District at Silver Peak, Nevada, the University of Nevada Oral History Program (UNOHP) realized a priceless opportunity was at hand—history in the making. Much like Dan DeQuille, who arrived in Virginia City during its heyday and whose diary offers irreplaceable documentation of the Comstock Lode, the program had the perfect opportunity to record the history of Nevada’s mining boom in the 1990s.

The UNOHP had already completed a number of oral histories documenting Nevada’s mining activity, especially in the area of the Comstock Lode, but there was more work to be done, so in 1997 the Nevada Mining Oral History Project (NMOHP) was created, with a focus on Nevada’s second largest industry—gold and silver mining. The program planned to gather oral histories in three phases, starting with the firsthand experiences of those who discovered and developed the world-renowned Carlin Trend, a fifty-mile-long and five-mile-wide belt of microscopic gold discovered in 1961 that rocketed Nevada into one of the top positions among world gold producers. Phase II documented the stories of miners who could recall all types of gold and silver mining and

milling experiences from the 1930s, while the intent was to have Phase III focus on the industry from World War II through the 1960s. This volume encompasses the interviews from Phases I and II.

The topics addressed covered changes and challenges in Nevada’s mining industry, including detailed descriptions of the skills required in underground mining that will be of interest to future generations. Large- and small-scale operations throughout the state were traced. Other discussions include how operational decisions were made, what roles government and politics have played in mining, how the environment affects mining, and vice versa, stories about daily life in Nevada’s mining communities, and much more.

This project was launched just as the price of gold plummeted to record lows. In spite of industry-wide repercussions, two major donors stepped forward and made this project possible. Our heartfelt thanks go to the John Ben Snow Memorial Trust and the Nevada Mining Association for their major donations to the project. Hycroft and Coeur d’Alene Mines Corporation were also kind enough to contribute. Because of their generosity, the UNOHP was able to begin work on the first

two phases concurrently. Now, documentation of the history of mining in Nevada has grown dramatically, thanks to fourteen chroniclers who have recorded nearly sixty hours of firsthand memories for the project.

For Phase I on the Carlin Trend, we recorded memories from J. Alan Coope, John Livermore, and Pete Loncar. Each contributed exciting and valuable information, from the initial 1961 discovery of the belt of microscopic gold, through the development of an operation that has helped place Nevada among the world's top gold producers.

While the type and grade of the gold being extracted in Nevada changed in the 1960s, so did technology. Don Duncan described starting Nevada's first heap-leach operation at the Cortez Mine during the 1960s and then helping other Nevada mines to add the technique to their processing.

As technology evolved, so, too, did government involvement. Bob Horton served as former Nevada Bureau of Mines Director and then U.S. Bureau of Mines Director, and John Gomes, whose family history extends back to the Adelaide Crown Mine outside of Golconda, worked at the Getchell Mine prior to World War II and then for the Nevada Bureau of Mines during the post-Sputnik era. Both provided valuable insights into changes in government's role in the mining industry over the years.

For Phase II, the program searched for miners who recalled all types of gold, silver, and copper mining and milling back to the 1930s. Chroniclers included Art Bernard, a former State Mine Inspector who began working underground at the Bristol Mine near Pioche at the age of sixteen; Tom Cahill, who offered extensive information about the Round Mountain gold operation; Ed Slavin and Jesus Martinez, who worked underground in the Tonopah area; and William Harrigan, a mining engineer who worked below ground at the Getchell and Copper Canyon mines, as well as others, until jobs became scarce in the late 1950s and 1960s.

Victor Kral, a longtime Nevada resident and University of Nevada mining school alumni, recorded his life history, which covers a wide range of experiences from underground copper mines at Ruth, Nevada, and the E.L. Cord cyanide mill at Silver Peak, Nevada, to surveying, mapping, and exploration geology. After later spending fifteen years looking after mineral rights for Ford Motor Company in the Upper Peninsula of Michigan, Kral returned to Nevada, where he worked as a consultant and part-owner of VEK Associates. Like many of the other chroniclers, Vic maintained a life-long passion for mining until his death.

Near Gardnerville, Bill and Blanche Shipley operated a small gold mine and mill. In their oral history, they gave colorful insights into the lifestyle of small mine operators and the daily challenges they faced. And in a later interview, conducted by Lynn Furnis, Claude Chaplin described his experiences with what were often one-man mining and milling operations.

While the project was designed to cover specific topics, like mining itself these interviews often uncovered precious nuggets, such as descriptions of Nevada's early characters who worked as tramp miners. Chroniclers recalled the personal stories generated by the age-old boom and bust of mining, from thrilling moments of discovery to sobering moments of loss when mines closed or claims didn't yield the value. Scattered in between was every imaginable tale, from Fourth of July celebrations to deadly accidents. The program also collected excellent descriptions of how Nevada's mining has changed over time, including the addition of women to the workplace and the activism of environmentalists who forever changed the way mines operate.

In addition to the Nevada Mining Oral History Project, the UNOHP has completed three other works on Nevada mining since 2000. The history of mining at Silver Peak, Nevada, funded by Mineral Ridge Resources,

Inc. inspired this larger project and resulted in both a research volume and a book. A research volume on Midas, Nevada, was supported by Midas Joint Venture and donated to the Friends of Midas and the UNOHP. It incorporated interviews conducted by Dana Bennett for her book on Midas, *Forward With Enthusiasm*, along with interviews by Victoria Ford that focused on mining and milling operations. Additionally, Battle Mountain Gold Company presented the UNOHP with a copy of its BLM Report No. 6-1901 on Copper Canyon in Lander County. The interviews for this project were conducted by Blanton Owen, a talented oral historian who has since passed away.

The UNOHP would like to thank all of the individuals and companies involved in these projects. Their contribution to our statewide mining oral history project is extremely valuable.

At some point, the program may continue the project and complete Phase III, recording Nevada's mining history from World War II to the 1960s. In the meantime, this Nevada Mining Oral History Project will be a valuable resource for generations to come—for mining engineers, scholars, attorneys, politicians, and others who need to understand the historical importance of Nevada's mining operations.

The NMOHP advisory board members deserve credit for their continued direction and support throughout this project. The committee included mining experts, archaeologists, authors, and historians. Their spirited help and guidance made this work possible, and the UNOHP would like to thank them for their time and talents:

Russell A. Fields, Administrator, Nevada
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Sally Zanjani, Historian, author, and Vice
President, Mining History Association

Charles D. Zeier, Cultural Resource
Specialist, Resource Concepts, Inc.

(The affiliations listed are those that were current at the time various individuals joined the advisory board.)

Many thanks to the advisory board members and to all who were involved in this project.

VICTORIA FORD

ARTHUR BERNARD

VICTORIA FORD: *Today is August 16, 1999, and I'm here with Art Bernard in his home in Carson City. Art, let's start by having you tell me just a little bit about your background. Tell me where you were born and raised.*

ARTHUR BERNARD: I was born in Italy on April 27, 1910.

And how did you come to be in Italy?

Well, my mother and father were married in a place called Delzell, Illinois, and his folks lived in an area not far from a place called Rocca Corneta, which is about fifty miles from Bologna. They were very wealthy people, and they owned practically all the countryside. It was on the Reno River in Italy, and I'm trying to figure out what the name of that little town is.

But they owned a lot of land in that area?

Oh, much land. There were six boys and two girls in the family, and none of them ever worked. I don't know which ones were the last to die, because I was never close to

the family. My dad left my mother. I was born shortly after they went to Italy and visited with his folks, and then he got a cockamamie excuse that he had to come back, that he was called into the service, and she never saw him again. He left her there in Italy, and we were there until I was five before we could make arrangements to get back. When we got back to Illinois in this same town, Delzell, she divorced my father.

So, if you were there until you were five, Italian must be your native language, then?

I spoke Italian fluently. When my mother married my stepfather in Salt Lake City, Utah, we were continually moving from one mining camp to another, and most of the miners were foreigners: Italian, Mexican, Serbian, Swedes, Cousin Jacks, Englishmen—every nationality. I naturally went to school and associated with all these foreign kids, and we visited from home to home. Most of these kids didn't want to speak their parents' tongue for some reason. Never bothered me. I used to like to talk with their parents, and in their language. And I got so I knew practically every one of these foreign



Art Bernard in 1999.

languages. Today, I can still remember a few words in various languages, but not too well.

There were Italians. In fact, my folks—after my mother married my stepfather, who was also Italian—spoke Italian in the home amongst themselves. I got so I could speak Italian as well as they could. After I began working in the mines, everywhere I went, there were Italians as well as Swedes and all the other nationalities. I spoke Italian with these Italians, and they were so impressed with the fact that I could speak Italian that they helped me all they could. I mean, getting fluent in Italian, again, was nothing. I got to the point where I not only spoke standard Italian, but I knew every dialect of the Italians in Italy, and there's a lot of them. People in those days, from a town ten miles or so away from where they lived, they all spoke Italian, but a different dialect. Some of the people in this one particular town had never been as far as the other town, and when they left, they came to America or to Australia or to South America, wherever they were going. I got to where I enjoyed speaking Italian. I knew every dialect.

I learned it from the other miners—from the Tuscans, the Bergamasks, the Venetians,

every dialect I knew. And they so enjoyed me speaking their dialect with them. They really thought this was something; they'd laugh and laugh. And I learned every song. I could sing it, I could read it, I could write it, I knew every dirty joke. [laughter] I thoroughly enjoyed speaking, not only Italian, but the other languages that I learned, particularly when I was in Bingham, Utah, during World War I and going to school there. Most of the foreigners there were Serbians and Austrians, and I got pretty good at those languages, but I can't remember any of that anymore. As I say, I can speak a few words in one or another.

In 1920, my stepfather, who was a mechanic and a miner, got a contract to drill an irrigation tunnel from a place known as Sanpete County. A man there, a rancher named Chris Larson, had thousands of acres of land but no water—I mean, not enough water to irrigate them. He somehow obtained water rights on the other side of the mountain and almost to the top of the mountain where . . . I can't recall the vertical distance from one valley to the side that came down into this valley. I couldn't remember the tunnel length exactly, either, but it was about a mile. My stepfather got a contract to drill a tunnel through there to pick up the water on one side and bring it into the other side. I think it took him better than a year to do that.

By then he had made so many friends, and he was quite a mechanic on anything. Automobiles were coming along about then, and he was interested in working on automobiles. He got a job as a mechanic in the Hupmobile garage. That is not the name of the garage, but they had the Hupmobile agency.

They sold Hupmobiles and Model-T Fords. I grew up with the people there in Ephraim, Utah. We were the only gentiles in town. The rest were all Mormons, solid Mormons. I associated with those kids, whose

families were either Swedes or Danes or Norwegians. There, again, in visiting in their homes, the old folks spoke their language. The kids didn't want to. I would speak with their parents and enjoyed it, and I learned those languages. But in this town of Ephraim, there was very little work. The only work was ranching, and I got into it. The kids there, when they were big enough to sit on a plow or drive a team of horses, they worked. Seeing a seven or eight or nine-year-old boy out driving a team plowing was nothing. The horses knew what to do, and all the boy had to do was sit on the plow, and the horses took care of the rest. But everyone had to work.

And where did your mom and stepdad get married?

They married in Salt Lake City, but they met at the mining camp of Ophir, Utah.

How old were you when you started working on the ranches?

I was about ten. When I was eleven, I decided to leave home, and I got a job as a camp tender at a sheep camp. I forgot to tell my mother that I was leaving, and I left and went up to this sheep camp. I had quite an experience. If you read my book, I described that.

I was going up there with a string of seven packhorses. One old mare had a colt, and he was scurrying around and bothering her. We were going up a steep side hill at an elevation of about ten thousand feet, and he pushed his mother off balance, and she rolled down the mountain. Well, the horses were tied nose to tail, and I had a whole mess of horses scrambling around trying to get up, and all the rock salt and groceries I had on those horses was scattered around the mountain. I was eleven years old. I was riding a very, very cool, calm horse, and he saved

the day. I gathered what I could and packed up.

I found this sheep camp where I was going to, and I don't know how, but I managed it. I was there that time, I think, eleven days, and I got a spot of dysentery, and I had to go home. And that's the first time my mother knew where I'd been. I did some awful things to my mother when I was a kid.

Anyway, I worked every summer on ranches. I herded sheep. When I was thirteen, I had an entire band of sheep, and I lambled it all alone while living in the camp wagon. I was the help. The boss's son was supposed to stay there and do the work, but he was busy chasing girls. He found out I could do the work, and I practically lambled a thousand head of sheep. I had sheep in the camp wagon, under the bed, in the bed, in the oven, anything to keep them from freezing to death—for the lambs that the mother died. They were called "beeter" lambs. I don't know what that ever meant. I never tried to figure that out.

But I did that, and I followed threshing machines. I pitched hay. I did everything in connection with ranching, but the pay was not much—if you got paid. They didn't always pay, the farmers you worked for. If you worked in the spring, they paid you when they sold the crops in the fall. If you worked in the fall, they paid you when they sold the lambs in the spring. It was kind of a vicious circle. And we, of course, knew that there were ranchers who were working in the mining towns, and they'd come back with fabulous stories about getting four and five dollars a day, and all of them with a new Model-T Ford.

And how much were you making on the ranches?

Oh, I got as high as thirty dollars a month as a camp tender, but the sheepherders themselves made from fifty to seventy-five.

Labor around the farms was two to two dollars and a half a day for grown men.

So you could make almost twice as much in the mines as at farming?

Oh, yes. At least twice as much. But they couldn't all leave and go to the mines. Most of the men got married when they were very young, and they started having their children right away. They couldn't leave the farms. But my friend Ray Nielson, whom we called Swede—his father was the town constable—and I sold our bicycles. I think we got ten dollars apiece, and we hitchhiked back to where I'd started school and where my mother met my stepfather. And we went there because I remembered the town and how to get there.

So, Swede and I hitchhiked, and it was pretty tough in those days. There were very, very few automobiles and very, very few roads. Roads in those days were mostly just wagon roads. Cars weren't very plentiful at that time. But we made it, and we finally got to Ophir, Utah. We went to the collar of the mines in the morning, since that's where they do the hiring. And to make it short, they told us to come back in about five years. So we had to leave Ophir, and we didn't have much money left. We'd been subsisting on stale doughnuts—we could get three or four or five for a nickel—for some time. And we got back to Stockton, Utah. There was one big mine there called the Honorein. From Ophir to Stockton was about fourteen miles, and we walked it all. Never got a ride that time, and we got there about dusk. We were very cold—it was in October. So we wound up down to the mine, and they had a big stable with horses and mules. They used horses and mules to draw their ore cars back and forth into the mines.

Even though there were cars at this point, there were not engines and rails under-

neath in the mines yet? They were still using horses and mules?

In many mines. Only in mines where they could get the animals in. Some mines, they did take them underground and put them on a skip, which is a mine elevator, and take them down to lower levels, but most of the animals were used on tunnels that started at the surface someplace.

We knew that it was taboo to go into a barn, but we were cold. We had to do something around nightfall, so we went in, got behind the mangers, and covered ourselves with hay. And we spent a very unrestful night. About five o'clock in the morning, an employee came in to feed the horses, and he found us. Naturally, he told us we were not supposed to be in there. It was strictly prohibited for anybody to be in the barns for fear of fire. In those days, hobos did a lot of traveling, and they slept wherever they could, and they all smoked. Many a barn went up in smoke then, so this was frowned upon.

We told him of our problems, being very short of funds, hungry, cold. He was an understanding young man, and he said, "Well, I'll tell you, I won't report you. You just stay here, and at seven o'clock, the boarding-house will open." At seven o'clock it was still pretty dark. He said, "You just walk in with all the miners. Don't act like you're a stranger. Just go in with them, sit down. Nobody will notice you or pay any attention to you. Get yourself a good breakfast." So we did that. Then he said, "And then, when you go to the office to rustle, don't tell them that you had breakfast." So we did that. We went in, and when they started bringing out the food, we thought this was our first trip to heaven. There was bacon, eggs, sausage, hot cakes, potatoes, big vats of coffee, and we loaded up.

Then after breakfast, we were going to the office, and I said, "The fellow told us not

to tell them that we had breakfast, but I think we ought to thank these people, whether they knew we were having breakfast or not.”

Swede says, “No, let’s do what we were advised and not get in trouble.”

We went into the office, and I assume it was the mine foreman sitting at his desk. There was a very handsome, big man talking to him. He had English riding breeches, English riding boots. He was a man who I later knew. He was six feet high and weighed 190 pounds, had a black moustache. Very handsome man.

We asked this foreman, or whatever his title may have been, about a job, and he smiled and told us the same thing that they told us up in Ophir, “Come back in about five years. You kids are too young.” I was fifteen and Swede was seventeen, but I looked the oldest, and I was the biggest. So he said, “We just couldn’t hire you, but come back when you’re older.”

We thanked him, and I said, “And I’d like to thank you for breakfast. We were hungry, and we went in with the miners, and we had breakfast. We can’t pay you, but we might do you a favor some time.”

He said, “Think nothing of it, son. Glad to feed you.” And as we were going out, this tall young man tapped me on the shoulder.

He said, “Just a minute.” And he asked why I wanted to go to work in the mine, and before too long, he had my history. He said, “Well, I can’t do any good for you now, but if you’re still in the mood to work in a mine a year from now, and if you ever happen to be around Pioche, Nevada,” he says, “you look me up. My name is Jack Beuhler.” And he got a piece of paper and wrote it down. He says, “I’m going down there to take over a mine. I’ll give you a job.”

So the following year, I didn’t fool around with Swede. I accumulated what money I could, and I finally hitchhiked and made it to Caliente, Nevada, between automobiles, walking, and side-door Pullmans. I got to

Caliente, and it was the day before Labor Day, which didn’t mean a thing to me at that time. I learned that the train from there went to Pioche the following day, and I thought, “I don’t know what I’ll do here tonight. Maybe somebody’s going to drive there. You can’t tell.” So I went into a saloon, one of the biggest ones I could see. It was called the Buckaroo Saloon, and it happened to belong to the county sheriff, a man named Charlie Culverwell. So, when I got up nerve enough to go up to the bar and ask the bartender, I explained my predicament, and I says, “I’m trying to get to Pioche, and I was wondering if you know of anyone that’s going to Pioche that I could go with.”

“Well,” he says, “you’re lucky.” He said, “There’s a fellow right here now, standing over there, and he has a cleaning department. He comes down here and gets clothes and takes them back to Pioche and cleans them, delivers them back here. He’ll be going back pretty soon.” The bartender called the man over, says, “Hey, there’s a young fellow here looking for a ride to Pioche.”

“Sure,” he says, “I’ll take him.” So, he turned to me and said, “I’m going to be a few minutes yet getting things ready and getting these clothes piled up, and then we’ll take off and go to Pioche.” So we did, and he had a Star automobile, Star Touring. In those days, they were known as “High Gear, All Year.” Snappy little car. It was so snappy that over this wavy, winding, dirt road to Pioche, I had to push it most of the time up the grade. It didn’t have power. It wasn’t running very good. This car, if it had been in good working condition, would have sailed up those little grades, but it didn’t.

Took us a long time to get to Pioche, and in the meantime, he was a man about thirty-five or so, and he got all my history, too. He said, “Tomorrow is Labor Day. You can’t get a place to stay in town. There’s absolutely no rooms, and it would be even hard for you to get in a restaurant to get something to

eat. I'll see that you get something to eat, and I've got a room in the hotel there. If you want, you can sleep with me."

"Well," I said, "that's fine." So when we got to Pioche, he told me where his room was in the Wyoming Hotel.

And what was this fellow's name?

His name was Pete Wadzagar. They called him Haywire Pete, and he was a character. I didn't know it yet, but I learned in years to come. His cleaning establishment was a little corner in the Sagebrush Saloon, owned by a fellow named Johnny Valente, with whom I became very well acquainted in years to come and had business dealings with. His cleaning outfit was a five-gallon can of some kind of fluid, and he'd dip the clothes in there, shake them around a little bit, wring them out, hang them up to dry, and press them. He had a wood stove there with a big iron and an ironing board. Very primitive, but he did a pretty good job. But anyway, he says, "I'll be busy here. You go on down to the Wyoming Hotel." He showed me where it was, and he said, "My room is number eleven. You just go on up there, and I'll be down after a while when I get time, and I'll see that you get something to eat."

So I went to the Wyoming Hotel. It was a big frame building, as all of the hotels in Pioche were and in most mining camps. I found the stairway—all the rooms were upstairs. I went up, and I found room number eleven, and I opened the door and went in, and I'd hardly got in there when someone else came in the room, and it happened to be the landlady. She wanted to know what the hell I was doing in that room, and I told her that the fellow that rented the room told me that I could sleep with him that night until I could make arrangements to go to work. I was looking for a man who had promised me a job in a mine.

She exploded. She says, "That bum hasn't paid his room rent for weeks and

weeks! I should have kicked him out a long time ago."

I could tell by her accent that she was Italian. She was a very plain-looking woman, at that time about thirty-five, a very efficient-looking woman. I started talking Italian with her, and she sat and looked at me with her mouth open for a while.

I gave her my history, and I told her that I had been promised a job, and that I needed a place to sleep, so Pete Wadzagar—I didn't know his name, but I knew it was Pete; the Wadzagar and Haywire Pete, I hadn't learned yet—had told me that I could sleep with him. I explained that I'd come to Pioche with him, hitchhiked with him. She says, "Well, you can't sleep with that guy. He's no good. I'll give you a room to yourself."

I says, "I can't pay for a room."

She says, "Nobody asked you to pay for it. You just come, and I'll show you where you're going to sleep." All I had was a little kind of a knapsack bag in which I had my few things.

When I saw Pete later on, I told him what had happened, and I said, "I may have got you in trouble. I don't know."

He says, "Oh, don't pay any attention to her. It's just her bark is worse than her bite. She's a good woman. She isn't going to throw me out," and she didn't.

So I found out then that her name was Amelia Meselod, and that she and her husband owned and ran this so-called hotel. Her husband, at the time, was in jail in Carson City. He had been caught bootlegging. Every once in a while the bootleggers were expected to get caught and do a little time to make the sheriff look good, who always advised them when the Prohies [prohibition agents] were coming, so there would be no booze around. But in order to allay suspicion, they all had to take their turns doing six months in jail. So her husband, at the time, was in jail. She had two daughters. The next morning, I went uptown to explore. The town was just bulging with people.

There were probably 2,000 people running around there, but not just from Pioche, from the surrounding country. They all came to Pioche for the celebration. This was Labor Day, and Labor Day is *the* day in mining camps. They have boxing contests or races, tug-of-war, anything you can think of. The two big events are the mucking contest, the drilling contest, and the prizefights. So I went in, kind of slithered along with the population into the Sagebrush Saloon, and I found a place to sit inconspicuously on a bench along one of the walls. In fact, all the walls were lined with benches. In the back of the place was Pete Wadzagar's cleaning establishment and a restaurant. I sat down at this bench trying to figure out what all the hullabaloo was about and what I was going to do and when I was going to do it and how I was going to do it. A little bit of a man came crippling over—he looked like he had a spring in his one leg. And he says, "Hello, kid." He said, "You hungry?"

So I said, "No, not really."

He says, "Thirsty?"

"No," I says, "I'm not really."

"Well," he said, "I'm Sport Watkins, and I've got cattle in the bank and money on the range, and if you need anything, you just call old Sport." He says, "Let me buy you a drink."

"No, no," I says, "I really don't want to drink."

"Come on," he says, "get in the groove of things." And he grabbed me. He looked like my little bit of a brother, and he had this little springy step. He took me over to the bar and says, "Give this kid a drink."

The bartender says, "What will you have?"

I says, "I don't know." I didn't dare ask for an orange or something.

"Yes," he said, "try some of this." He got out a bottle of home brew, poured some in a glass for me.

Sport says, "Put that on my tab."

The guy says, "OK, Sport, no problem." Sport left, and this bartender told me, he says, "He hasn't got a nickel. He's never paid for anything. He can't pay for it, but we all humor him. We like him."

Well, I learned then, as time went on, that Sport was quite a character. Years before, he'd been a famous jockey and a horse thief, and he'd been caught stealing horses. Halfway between Pioche and Ely was a seep called Pony Springs, and there was a grove of cottonwood trees there in this seep, which made a pretty good puddle of water. The stage from Pioche to Ely and back would stop at this Pony Springs to water the horses, but there was no facilities there at all.

Sport had been caught rustling horses, and they took him to Pony Springs there. They happened to be near there, and they took him over there to hang him. They brought him on his own horse; they tied his legs under the horse, put him under a tree and were getting the rope ready to put around his neck, and they made the mistake of leaving Sport with his own horse.

He was a phenomenal horseman, according to history, at the time, and he knew his horse just like he knew people, and he got away. He got that horse in a lope, in a gallop, and by the time they got their horses, he had a little distance. They started shooting at him, and they hit him in the knee, but he got away. How he got his hands and feet untied, no one will know, and he never told, but somebody must have found him and helped him. His knee had rotted without medical care, and it had just got to a point where it was just a mass of cartilage. He could walk on it, in a sense—he looked like he was dancing all the time. When they got him back, with the fact that he'd pulled this awful disappearing act and got away from them, they decided they wouldn't hang him, and he became the town character.

So time was marching along then, and the events were about to start. Another

miner there had kind of taken me over. His name was Tony Argento. He was one of the miners in town to celebrate. I unloaded and told him all my problems and that I'd met this man named Jack Beuhler who said if I got to Pioche, he'd give me a job.

"Oh," he says, "that's my boss. I work at the Bristol Mine. Sure, he's coming in."

I said, "Will you see that I meet him?"

"Oh, yes," he says, "No problem. Let's go watch the fights."

The crowd was gathering around the ring built in a sort of an amphitheater behind the Standard Service Station, and here was this ring surrounded with people. Up in the ring was a man walking around. He had on a pair of pants, but no shirt. He was the meanest looking thing I've ever seen. Just to look at him frightened me, and he was just a mass of tattoos all over his body. You couldn't tell where his nose started or where it ended. His eyebrows were masses of scar. He had a flat nose and mean-looking eyes. And this guy's name was Iron Jaw Slade. He was one of the principal, main-event fighters, and he was pacing around this ring all by himself. They soon learned that his opponent, whatever his name may have been, didn't show up, so they didn't have anybody to fight, and after the crowd was getting exasperated, the announcer said that this other guy was not going to show. "Iron Jaw will meet anybody in the crowd. Anyone that can stay with him for two rounds gets twenty dollars."

There was a lot of excited talk around, going back and forth, and my friend Tony said, "You a fighter?" Tony was an Italian and spoke with an accent.

"No," I said, "I wrestle, but I don't know a thing about fighting." As a kid around this farming community, wrestling was the sport of everybody, and I was pretty good. I could throw anybody my age and size and could even handle a lot of the older teenagers and men. But I didn't think I was really in the condition to wrestle with anybody, so I just

told him that I was not a boxer, but I knew a little bit about wrestling.

"Hey!" he says, "My friend there will take him on!" And he started to push me up into the ring, and he got three or four fellows around him. They all helped him, and I found myself up in this ring. Here was this brute of a man. I didn't know what to do or what to say, and I don't remember if I said anything, or anything else, but the people who were promoting this fight, or running it, came over with a pair of boxing gloves and put them on my hands, and I was so frightened, I couldn't resist. They gave me all the instructions about what I was supposed to do, which didn't mean a thing.

They took me over to the center of the ring, and here came Iron Jaw. He didn't say anything; he just looked at me. And then I was told to go to my corner, which was strange to me at the time, but I know now what they meant. "Come out at the bell!" The referee had given us a lot of instructions, which I didn't pay any attention to. My mind wasn't there. Nothing was there.

From the corner, the bell rang, and here came Iron Jaw right across the ring, looking at me and his hands in a fighting position. When he got near me, I was so frightened, I don't know what I did, except I jumped all over him, and I screamed and scratched and probably kicked and bit. I don't know what happened, except that Iron Jaw slipped to the floor. He was down. The referee came over and counted to ten. Iron Jaw didn't move. People started to surround me. One guy had put a twenty dollar bill in my pocket, which was the biggest bill I'd ever had. [laughter] And they took me out of this ring and headed me for the Sagebrush Saloon to buy me drinks. By the time I got there I thought, "Maybe I did whip that guy." What actually happened, he was as drunk as his opponent, who didn't show up, and when I jumped all over him, he just couldn't stand up. He just fell down.

So you hadn't actually knocked him out?

I don't remember. I never hit him. I probably just grappled him to the floor. After a few drinks, I felt that maybe I did whip him. And I had twenty dollars in my pocket, and I didn't offer to buy any drinks. Somebody asked me if I was hungry, and I said, "Yes, I am." So we went back to this restaurant, and there was a man cooking and a nice looking, worn-out type of a woman that was a waitress. So she came over to ask what I wanted, and I didn't think to look at a menu. I said, "Gee, I don't know."

"Well," she said, "we've got some good pork chops."

I says, "That sounds good."

And she, for some reason, started mothering me right then. She brought me the pork chops, and when I got through, she said, "How about some dessert?"

"No," I said, "I'm doing fine here."

She says, "I've got some nice lemon pie. I'm going to bring you a piece of lemon pie, and it's not going to be on the bill." So she brought me the lemon pie. I ate the lemon pie, and I think the cost was forty or fifty cents for this meal of pork chops. I paid it with my twenty-dollar bill and got the change. I later became well acquainted with her and with the cook. The cook was the deputy sheriff's son, but already near middle aged. And the woman was a worn-out prostitute, and they were living together. As time went on, I got very friendly with her, and I never forgot how nice she was to me when I first came. Her husband and I became very good friends. In fact, the whole family and I became very good friends, and two of the boys and I became bosom buddies—hunting partners and everything else. But at that time, I didn't know the cook or the waitress. Anyway, everybody took care of me. I guess I just looked like I needed taking care of.

Toward evening, Tony looked me up, and he said, "Mr. Beuhler's in town."

So I went, and I saw him, and I says, "You may not remember me, but I . . ."

He says, "I remember you. You stopped in last year. You came for that job."

I says, "I did."

He says, "I'm glad to have you." He says, "We'll be going home right soon, because I've got my two little girls with me, and I've got just a little business to do, and we'll go back." So I stayed, and I made sure he didn't leave me. I kept track of him, and when he got ready to come, we got in his car. He had a big Master Six Buick. Gee, big, beautiful car. And he had two little girls. One was about six, and one was, maybe, eight or nine. We drove out this dirt country road twenty-five miles to the Bristol Mine, which was way up at a pretty good elevation of about 7,000 feet. This was an old mining camp, and lots of the wooden cabins were empty, and the mine had shut down. Everybody went into Pioche for Labor Day, and he said, "Do you know anything about fireworks?"

I says, "No, not really."

He says, "I promised the girls. We couldn't stay in town for the fireworks, and I bought a few things. I guess it's kind of simple," he said. "While I'm putting things away, why don't you set these off?" We were in this sort of a canyon. His house was here, the garage was there, and there were houses all around the surrounding hillsides. He says, "Set off these fireworks."

So, I looked, and it was obvious how you do it. You lit them and put them down, and they exploded. I did that, and the first one, it exploded and fell on the sides. You know how our hillsides are now, full of cheat grass and brush? That's the way it was this September night, and fire started all over. There were just he and I; all the men were in camp. And his wife was somewhere; she wasn't there. So he and I were very, very lucky. We got all those fires put out by ourselves, but it was a job. Then he showed me the various cabins, and when the store opened the fol-

lowing day or whenever, they would have blankets and everything for me to sleep on. I didn't have any blankets with me, but there were these empty beds in these cabins, so he found me a couple of blankets to sleep on. And that was how I came to Pioche and how I started working in the mines.

You were underage to work in the mines. Is that right?

I was underage, but nobody paid too much attention to it. As they told me later, when they asked me to register to vote, I said, "I'm too young."

They said, "You're big enough. If you're big enough, you're old enough." And that's the way it was working in the mine.

What's the first job that he put you on, then?

I was a top-car man. That is the hoist. The skip, loaded with minerals, comes up out of the top, and it dumps into an ore chute. There's two ore chutes, or a big ore chute separated in two by a wing. When they bring up the ore, they swing the gate one way, and it goes into one chute, and when they bring up the waste, they shift the door, and it goes into another chute. So, at this particular mine—and most mines of that size at that time—they have a man who runs the top car. He has a steel car that holds a yard of material. That's anywhere from a ton to a little more to a little less, depending on what the material is. The top-car man, when he's loading, when he's taking ore out of the ore bin, takes it over and dumps it over a grizzly where two men—or one man, depending on how much work there is to do—sort the ore. They throw the waste out of there, and the ore goes down into another bin, which, in this particular instance, was put into tram cars and hauled over a mountain to a place called Jackrabbit, where the train from

Pioche, a little dinky narrow gauge, took it from there to Pioche.

When they had the waste all out, he trammed the waste, and he put that over the dump. The dump, at this particular time, was hundreds of feet deep, and if you weren't careful, you could dump the ore. If you didn't open the gate in time on the ore car, it went over the dump. And getting it back up was quite a job, because it had to be taken down to the bottom, put into a truck, and hauled up around the mountain. Top-car men were not supposed to let that ore car get away from them. It's one of the first things that happened to me. I was in a big rush, and I lost the ore car.

But anyway, to make a long story shorter, I became, probably, the champion top-car man in history there. God, before that, they'd oftentimes had to put someone on the night shift, because the top-car man couldn't handle it. I never had enough to keep me busy, and I made quite a reputation as a top-car man. I stayed with that as long as I had to, but I got twenty-five cents a day less than the muckers in the mine, and they got twenty-five cents a day less than the miners. The miners, at that particular time, were getting five dollars a day, the muckers \$4.75, and being on top in the fresh air—I was the top-car man—I only got \$4.50. I wanted to get into that big money, and I was very popular with all the bosses, because I was a hard worker. I asked if I could go down in the mine and be a mucker. "No. God, no. You stay on this top car. This is the best job."

"I need that twenty-five cents a day." I chiseled and chiseled till they finally put me down there mucking, and I was the best mucker in the mine. I did that for quite a while, and then I wanted to be a miner.

"Well," they said, "kid, you've got to graduate. You've got to learn to mine, and if you're a miner, you've got to handle the powder and blast your round."

I says, "I've watched them. I can do it." I was now about seventeen.

So you went through these jobs pretty fast, right?

Oh, yes. So I talked myself into being a miner, and I became probably one of the best miners. Whenever they had tough ground to blast anywhere, the shift boss would always say, "Get Art." Here I was, a snot-nosed kid doing mining work that old-timers couldn't figure out. But I was a natural. I could tell the geology of the veins, how to put in my holes to make them break. And underground when I mucked, I was just so much better than anybody else, I always did more work, and I got quite a reputation.

So, the following year when I was eighteen, somebody suggested I should enter the mucking contest in Pioche. I says, "Oh, God, no. I couldn't compete with those guys. Those guys are good! The best in the country!"

"Oh, hell," one of those old miners says, "I've seen them all." He says, "Nobody can beat you with a shovel." There was one guy, and his first name was Frank. He was about thirty-five, a husky man from St. George, Utah, and he won it every year; he was unbeatable.

I knew about him. I said, "Hell, I couldn't beat him."

"Oh, you can beat him." So he talked me into entering, and I was then not quite as bad as when I went into the ring against Iron Jaw Slade, but I was very nervous. I didn't know what was going to go on. But anyhow, this particular year, the contest was to move a yard of material. They had a yard of material in a box and a wheelbarrow. We pushed the wheelbarrow there, loaded it, and took it out and dumped it in the other one. The fellow that did it the fastest won the prize.

So I registered in the mucking contest, and the entrance fee was five dollars, a day's wages. All the entrance fees went to the winner, plus a little prize that they had: twenty-five or thirty or fifty dollars, whatever it happened to be. It was different every year. The winner of the first prize was good for anywhere from two to three hundred dollars. This was fabulous money. My turn was about third or fourth, but I'd mucked before this champion came up. His number was back in eight or nine or somewhere in there. When they gave my time, the crowd says, "That's the winner. Nobody going to touch him." And they didn't. The master from St. George did his best, but hell, he was a minute behind my time! I was all alone. Nobody ever equaled it. I won that mucking contest every year I entered, except two years during the war they didn't have it.

The last time I entered, it was 1941. I was deputy inspector of mines, and I had no intention of entering that mucking contest, but my youngest brother was entered. He registered, and they had a deadline for registry. If you didn't register by this deadline, you couldn't compete. By deadline, only four had registered. My brother was one of them, and three others. Well, then they held a meeting and decided, "We're going to open it for another five minutes."

There were several muckers who knew I wasn't entered. "Since Art isn't in there, let's enter."

When they all got through entering, I went up to a fellow named Rex who was in charge of it. I said, "Rex, I think I'll enter."

"Well, you promised you wouldn't."

I said, "I didn't promise I wouldn't. I just said I wasn't going to register, but then you were not supposed to open it." I said, "Now, since there's a pretty good pot there, I'm going to get in it." I figured, "Well, they did this just to keep my brother from winning,"

because he was pretty good. He wasn't as good as I was—a lot younger, but not as good. So I won it all by myself again. That's the last time I ever mucked.

What kind of times did you get on mucking?

Oh, it would depend. Every year, it was different. Sometimes they went down through rocky material in a box and shelled it out. Other times, they did it the way we did it the first time, and they were always changing, but my time was from three to five minutes, and the others were much longer.

Well, anyway, after my first experience in the ring with Iron Jaw Slade, everybody had the idea that I was a good boxer. I thought nothing of it, except that any time anybody's supposed to be good at something, somebody wants to beat him. Every time I went to town to a dance or something and I was around the saloon or out, somebody always picked a fight with me. The fights never lasted very long; when I hit them, they stayed hit.

Well, that went on until one night, I got my finger broken. I was loading cars, like I told you about that top car, only this was years later, and I had my hand on the edge of this steel car and barring with this hand, and the rock came down and hit me there. It broke this finger, and it was just hanging by a thread. The bone was broken.

The only car in town to take me to a doctor was a little, roly-poly guy from some town near Coalville, Utah. He had a Model-T Ford Coupe. I was on the night shift, which went on in the afternoon, and I came out of the mine, and they dressed it up, but they had to get me to a doctor, and nobody had a car except this kid, and he was on duty, too. So the foreman made a deal with him that they'd let him off work and pay him his wages if he'd take me to town to a doctor. We went down to this Model T. All the four tires were flat, and you had to pump them up by hand. We finally got started, and we went to town.

There was only one doctor in town; his name was Hastings. I had put on cleaner clothes, but just more overalls and a blue shirt. So we went over to Hastings, and he wasn't there. Something had happened. He was out delivering a baby or some damn thing, and he was out of town. So we had to go over to the Sagebrush Saloon and have a drink. We had a few drinks, and I forgot all about the thumb. There was a dance in Caliente twenty-five miles away, and so somebody in the saloon unwrapped my hand and went and got some tape, taped it up, and did a fairly good job and decided I ought to go to Caliente to see Doctor McCall. So we took off in his Model T, and we went to Caliente, and Doctor McCall was out. Couldn't find Doctor McCall.

So we were going to go over to a saloon on the other side of the tracks, and we stopped and parked the car by the theater. There was a big sign out by the theater where they used to put those things that advertise the show—pictures of Clark Gable and whoever else. We were standing there, my partner and I, and a guy came along and just jumped all over my partner and started beating him up. I says, "What the hell are you doing here, anyway?" So he took after me, and I hit him and knocked him through this billboard, and that was the end of him. What had happened, somebody had taken out his girl, and he thought it was my friend. He'd made that mistake, and then he made the mistake of taking after me. His name was Ed Keele, and he was a bigger man than I was—not any taller but just as tall, and ten, fifteen pounds heavier.

So I never did see a doctor. We went back to Pioche, and that finger eventually healed just as good as it was new. For many years, it was a very noticeable scar there. Its almost gone now.

I went into another dance in Pioche one Saturday, and when I was up in the dance hall, all dressed up dancing, a guy came up, and he says, "I'd like to see you outside." I

went out. He says, "You made a sneak punch on my brother. Now you're going to have to settle with me."

I said, "Who the hell are you?"

He says, "My name is Jigs Keele." Rung a bell. It rang a bell again, because the name Keele was familiar. The Intermountain heavyweight champion's name was Jake Keele, and he was well known. He was six-foot-two and weighed 210 pounds, and he was 24 years old. Jigs was about 22 then, and Ed had been about 20. I was 18. So he said, "You want to go outside?" We were out in the dance hall. He said, "You want me to flatten you out in here?"

I says, "Let's go outside." We got outside, and he made a swing at me, and he missed me, and I made a swing at him, and I didn't miss. I knocked him into a tree, this cottonwood tree, and he hit it with his head, and he was out.

While we were there, a lady came up, and she called me every name she could think of. She says, "You picked on my brother!" By the way, this Jigs Keele was bigger than I was. He was bigger than Ed. She said, "You pick on them. You're a big bully." I weighed 170 pounds. I was smaller than any one of these. She says, "I've got one brother that can handle you, and he's going to come and do it."

I says, "You better bring the whole family, because from what I've experienced so far, it's going to take more than one." That was along in the fall. On Christmas Eve, I was all ready for a dance, and it was cold, and I had a brand new suit on—the first time I'd worn it—tailor made. I was in Johnny Valente's Saloon in a high poker game, and somebody came over and tapped me on the shoulder. I looked up. I knew who that was. That was Jake Keele.

He says, "Are you Art Bernard?"

I said, "Yes, I am."

He says, "I gather you had some problems with my brothers."

I says, "I did."

"And I gather you told my sister that she'd have to bring the whole family along to take care of you."

I said, "I think I made that remark," and I knew I was in for the beating of my life.

"Well," he said, "step out here a minute." I stepped out. Two or three guys followed me. One was named Bill Adir. He was working up at the same mine I was, and it developed that he was a shirttail relative of the Keeles. He followed us out. Outside it was cold, and the streets in Pioche are on a pretty good grade. At that time, the street was dirt, and there was a gutter on each side—no curb or anything. The cars came along and headed into this gutter, and there they were at half cock, one here and one there. The street was just nothing but ice. So we got outside, and he says, "I understand my brothers. They're not all that innocent. I think they probably egged you on a little bit, but," he said, "I don't like that remark about having to send the whole family up here to take care of you." He said, "If you want to apologize, we'll forget it."

I said, "I see no damn reason to apologize. Your brothers picked a fight with me. I defended myself. They're not as tough as they think they are, and I don't intend to apologize to you or anything else for anybody."

"Well," he says, "that leaves me no alternative. I'm going to have to beat the hell out of you."

"Well," I says, "all right." I started taking my coat off, because the first thing I thought of was this nice white shirt and my new shoes, and I'm going to be beat to a pulp and nothing but bloody. Here goes this nice new shirt. I turned around. A big crowd had collected. I said, "Will somebody hold my coat?" Nobody wanted to hold my coat. They didn't want to get in trouble with Jake Keele.

This Bill Adir says, "I'll hold your coat." I found out later he was shirttail relative. So we went out in the street, and this man was experienced. He made it a point to be on

the upper grade, uphill on me all the time. He outweighed me by forty pounds, and he was six years older. He was a fully formed man, and I was just getting there. I was fighting uphill all the time, and by the time we got up there, opposite the Norris Drugstore, I'd got uphill on him. I'd beaten my way up above him, and I hit him and knocked him down, and he slid under an Oldsmobile Touring Car that was parked in the gutter. And there he lay. They pulled him out; he was unconscious. He was beaten to a pulp. I couldn't believe it.

They hauled him into the drugstore, took him back of the prescription counter and laid him on the counter. I told you about Norris, who was justice of the peace and later became state senator. He owned a drugstore and a ranch, and his daughter, Edna, was married to Art Acord, the old cowboy movie actor. That's long before your day. You probably never heard of Art Acord. Norris's son was, through his daughter and son-in-law, a bit player in the movies. Anyhow, he had this drugstore, and he was also a bootlegger. He sold bonded stuff, Four Roses and that sort of stuff, that he could get from the government, and then he passed it out only to special friends, which by that time, I'd made the grade, and I was getting some of that high-class whiskey. Norris and I were good friends.

I went in and looked at Jake Keele, laid out on the counter there. I don't know how I did it, but I damn near massacred him. He was just beaten to a pulp, and they sent for Doctor McCall. Doctor McCall came down, and he said, "Well, there's nothing wrong with him that a little liniment and some rest can't fix." He said, "He's just exhausted and beat up." Oh, they made quite a to-do about it.

I don't know what they thought of me, but everybody was trying to help. The barber was there, and he says, "Come on. I'll open the shop and clean you up." My shirt was full of blood. My coat was all right. Bill Adir had that. Blood didn't get on my pants.

The fellow that owned the haberdashery, named Joe Cohen, said, "What size shirt do you wear?"

I said, "Sixteen and a half." He went down, opened the store, and come up with a nice, new shirt. The barber took me in and gave me a facial or whatever. He put me in good shape. The only mark I had on me, besides my fists being so sore that I could hardly move them, was I had a chipped tooth. I had just demolished the Intermountain Heavyweight Champion.

Was this the beginning of your boxing career?

From then on, I fought the main event of every fight that came to town, and I don't know how long it took before there was nobody left to fight. Everybody decided I was world-championship material, and they talked me into going to San Francisco, and I did. When I got down there, through a lot of luck, I got taken over by Larry White in his fighting stable. He, at the time, was manager of Young Corbett, the welterweight champion of the world, and he had two contenders.

I had quite a lot of interesting fighting experience, boxing experiences, but I never did fight—two or three exhibition fights—for more reason than one. One, Larry didn't encourage me to fight, because he told me, "It's going to take years for you to mature," and he says, "You haven't got the patience." This was after he watched me work out in his camp. But he liked to keep me there, because he couldn't drive, and he had a Moon Roadster, and every time he wanted to go somewhere, I did the driving. He had a beautiful young wife—well, not young, but younger than he was—named Sheila. She was a redheaded, Irish, wonderful woman. As long as I was with Larry, she felt safe. She felt that he wasn't going to chase any chippies around, because Art would be with him. I met the best fighters in the world,

became friendly with a lot of them, and I had some wonderful experiences, but I never pursued the boxing game. I came back and went to mining. I knew more about mining than boxing.

So you were gone for a while from Pioche, right? You went down to San Francisco for a while?

Well, I was in and out. I'd go down and come back and down and back.

But Larry White wasn't ready to put you in the ring yet?

No, no. I never did. I had to tell him. I had the ability; I could have. But I just didn't want to do it myself. I saw what those fighters looked like and what they had, and it just wasn't for me. The training is like going to jail, I guess. You go to bed at a certain time; you get up, and you run so many miles at a certain time, and then you get in the ring, and you train there, and then you go rest a while, and then you go in the ring and train again a few hours later.

It's a miserable life, and it goes on for months and months. And all this time, you're not making any money. You're lucky if you make enough to help out a little bit. And everybody that gets into the situation I was, where you're not making enough money to live, to subsist, you've got to get a job to help out.

With my connections being in Larry's stable, I got a job with one of *the* most important bootleggers in town. The bootleggers are always kowtowing to what fight managers got that they want. A man managing a group of fighters is one of the most popular guys around, because he can get these people seats to a fight. He can get them here, he can get them there, and there's no end of favors he can get. Through Larry, I went to work for the chief bootlegger in San Fran-

cisco, and I made a hell of a lot more money than the boxers were making.

But boxing kind of goes with the mining camps. Like you mentioned, wrestling went with the ranching community.

There was always boxing and ball games—baseball—in the mining camps. The two popular sports.

Did you play baseball too?

No, I didn't. I never was interested in baseball.

The boxing was more interesting to you?

Well, it just came along, and once I started knocking these guys out, it was like a disease. I couldn't stop.

So whether you wanted to or not, you had the reputation.

Yes, and I had to defend it.

So when you went back from San Francisco and decided not to go into boxing but to stay with mining, what happened then? What job were you on then? Were you underground mining?

I was underground mining, yes, from then. I went from mines in Utah. Mostly, it was around Lincoln County and Pioche, because there's where I had connections and there's where Mr. Beuhler made sure that I became a mining magnet, so to speak. He kept pushing me up the ladder, and he always used to explain this ladder. Every time I'd leave, he'd give me that story about the ladder. But you'd crawl up that ladder, and you get higher and higher, and then all at once, you fall. You've got to start all over again. This he would tell me, "You're here at

this station. Now you quit, and you've got to start all over when you come back."

And is that what he did? When you would take off, he would start you back at the beginning again?

When I'd come back, he'd start me again, and he made me a mine shift boss, and he made me a mine foreman. I was the son he'd never had. He had three daughters. One was born after I got connected with him.

How old were you when you were the shift boss?

Nineteen the first time. I was awfully young. It was quite unusual. It might have been because the fellow that I was a shift boss for, a leaser up in Stockton—I went back to Stockton in the Honerein Mine in later years—made me the shift boss, probably because he knew that I would stay sober and take care of things, because I know that most of the men that worked under me were as good of miners as I was, probably better. They had more experience.

But you were more responsible at nineteen?

I was more responsible.

What was your favorite work underground? Did you like it when you got promoted to shift boss or mine foreman?

Well, yes. It was an advancement and naturally more money, but what I enjoyed about mining was the actual work. I took great pride in being able to do what others were failing to do, and I took great pride in timbering. I was an excellent timberman. I never worked for a boss that didn't have the greatest confidence in me and never worked for somebody that didn't give me more responsibility than my job called for. Mining, to me,

was very, very interesting. I didn't think I'd ever do anything else. It's the most interesting thing I ever did until I went to prison.

Went to prison?

And that was really a challenge!

[laughter] And by saying you went to prison, you're talking about your job as the head of the prison?

Head warden, yes.



We're going to talk a little bit about the Bristol Mine now and maybe about some of the equipment and mining methods that you saw there.

Well, the equipment used underground at the Bristol Mine was strictly jackhammers for regular drilling, to drill to blast ore, which at this particular mine came in large ore bodies. And there were mounted jackhammers of different kinds that you used for drilling tunnels, which we called drifts, and stoping machines, which you used to run raises.

Did you have electric power in the mine to run the jackhammers?

No, they were all run by air. There was a compressor on top that made the air that was piped underground.

We had carbide lights, and when I started mining, we had caps that held our lamp, and they were cloth caps. And very few miners, particularly six feet or more, such as I was, had any skin on their head from hitting their head on the top of the drifts.

That's all the higher they were, was six feet or less?

And in the olden days before my time, men were smaller, shorter, and particularly, those called "Cousin Jacks," or Welshmen. They were very good miners, but a giant would be about five foot six, or something, and so they ran these drifts according to their size. Miners got taller later, and they were always hitting their heads on the top of the drifts, and when *they* started running drifts, they were higher: six feet and more.

But your cap was a cloth cap?

Just a cloth cap. There's no protection at all. It was made of canvas with an apparatus in front that held your carbide lamp. Later, hard hats came into effect, and they were cumbersome things to start with, but they finally improved. The modern one is not much worse to wear than a regular hat that you wear. Later, electric lights came, battery lights came, and you carried them. I had a real nice setup that I left at my house when we sold it this spring, out at Bristol. I carried it around all these many years. It's a battery that is in a pouch, and you wear it on your belt, and the light comes around over your shoulder and into the light on your cap. That was a great improvement over carbide. Today, I doubt if there are any carbide lamps used anywhere anymore.

Now, the Bristol was an old mine, you said? And were you mining gold there?

Gold. The material there contained gold, silver, copper, and zinc.

And was there a mill nearby?

No, there was not at the Bristol Mine. That was not milling ore. That was oxide ore, and it was shipped to the smelter at Tooele, Utah. There were various smelters. I forget all the towns, but they were all around the Salt Lake City area. We sent it across the

mountain on a tramway and took it to Pioche on the narrow gauge and then from there on Union Pacific, regular railroad.

So you used the air-powered jackhammers, to drill the holes. And then were you using regular dynamite for blasting?

Dynamite, yes. Giant powder.

Giant powder? Was that the brand name?

That's dynamite. There's several brands, which I can't remember too much now. Every miner handled his own powder, but some mines, they have a powder monkey that handles the powder. But at this particular mine and practically every mine I ever worked in, I handled my own powders. All of the other miners did.

So you made your own determination how much to put in the hole?

Yes, how much to put in the holes and when to shoot them and what sequence to shoot and whatnot. And how you drill these holes—regardless of whether you're running a drift horizontally, a raise vertically, or sinking a vertical shaft—knowing what your powder will do and how to place it and how to drill the holes is very important. That's the difference between a good miner and a poor miner.

How did you learn that? Did some of the other miners teach that to you?

Oh, yes. They showed me how to drill the holes, and they explained more or less the different powders, the 30 percent, 40 percent, 50 percent, the different percentages of the explosive capacities of the various dynamite and how it worked. And then, of course, you get good by experience, by drilling holes in various ways in various strata

and learning how they break with so much powder, and you get so you know. You kind of feel your ground. The rock seems to talk to you and tell you what you have to do to break it. Some miners are just absolutely good at it, and others never do learn.

At the time that you were working there, were there people like geologists who were telling you where to mine, or was the ore body there and you were turned loose?

There was always a geologist and an engineer who mapped the country and determined where to go. They were not always right. One particular experience was in the Bristol Mine, and it was the last time I mined. I and another group of men had taken a lease on the fifteen-hundred level, and we had ore that we mined, and it was a partnership with the company. They gave us a three-month lease, and what it amounted to was a three-month cleanup. Anytime they wanted to take this lease away after three months, they wouldn't renew your lease. How long they let you work depended on who you were, and you will realize what I mean.

There were six of us that had this lease, and I was the head leaser, and this was in 1940. I was married, and I'd gone through three or four mines that I told you about before where I'd had leasing options with a fellow named Owen Walker. One was the Half Moon, one was the Highland Queen, one was the Mendah. We'd never taken up any of those options. I'd gone back to Bristol as mine foreman, and it really didn't pay a hell of a lot of money. I was the second in line, but the wages were very low at that time, and I had to buy a certain amount of the stock, and it was taken out of my salary. That was considered part of your pay. In other words, I had to buy stock, but the price of the stock was kept out of my salary, and I accumulated the stock.

I accumulated a hell of a lot of stock and paid no particular attention to it, because I never thought it would be worth anything. So I really wasn't making enough money, and I went in this lease with my five fellow miners. We paid the mine a 50-percent royalty. We did all the mining, they furnished the material that we needed on exploration work. If we were mining ore, we had to buy the material—the powder and timber and whatever we may need—but if we were exploring, we furnished the labor, and they furnished the material. So we had an ore body down there that we were working on, and we were doing pretty good. It gradually depleted itself, and we were out of ore. So we had a very good engineer there named Paul Gemmill.

Is this the same Paul Gemmill who was later at the university?

I think so. He worked for the mining. Well, it had to be the same one. There was only one Paul Gemmill. He died here about eight or ten years ago, and his wife just died three or four years ago.

If we wanted to look for new ore bodies and then were not getting any material out, they furnished the powder and the material if they thought there was any chance. If they didn't think it was a good gamble, they said, "There's no prospect there at all, so we won't participate. If you want to go in there, you've got to do it yourself."

So I was on a little streak of ore there that I thought, "This has got to make." And the company, which actually was Gemmill, because he was the engineer and geologist, said they would not participate. If I wanted to go in there, then we'd have to pay our own way.

My partners figured that he was a hell of a lot smarter than I was, and they said, "If Paul said they're not going to pay, we're not going to pay, either." So there we are. I knew

there was ore back there, and I was very committed to this mine, more so than Paul was. I had been there a lot longer, and I'd done every type of work in that mine, and I'd seen how various ore bodies had been located before and the mineralogy behind it.

So there was one fellow there, one of my partners, named Tom Grassi. One day I said, "If you guys don't want to pay for the powder, I'll buy it myself."

And Grassi says, "I'll help you." He said, "If you think there's ore there, let's go."

So then, the others said, "Well, all right, then we will, too." And I kept drilling, drifting in on this. It was just a sliver when I started, and it got to about two inches wide, and the next round I put in, it got about four foot wide, and it was high grade. You could eat it. We had a fortune there.

Just about then, I came through Carson City, and Matt Murphy and I got talking about the deputy mine inspector, who was getting sick, and jokingly, I said, "Well, if Jack dies, give me a ring. I'll take his job."

Matt Murphy was the state inspector of mines. Now, I knew his deputy mine inspector, because he came around the mines where I was. And his name was Jack, and he was sickly. He had the "jackhammer laugh." That's dust on the lungs. You cough your lungs out. Silicosis.

So I jokingly said, "If Jack dies, give me a ring. I'll take his job." Thought no more about it. And then I drilled into this vein, which developed to be about four feet the last time I was there, and we took the samples up, and you could eat it. It was just fabulously rich.

I got up, and I found a telegram from Matt Murphy, "Come down to Carson City and be sworn in as deputy inspector of mines."

I told my wife, I says, "Now it would come. I can't take it. We've got a fortune down there."

She says, "I want to get out of here. I don't want my kids to grow up here with one

leg shorter than the other walking around these sidehills," because I'd be located in Ely. She said, "We've got school there for the children." We only had one child at the time.

I said, "I think you're right."

So now, from the time you started until this job came up, about how many years were you in mining?

Fourteen years. Went from 1926 to 1940.

That's when you took over as deputy mine inspector?

Yes, September of 1940. Anyway, we had a deal amongst ourselves that if any one of us ever wanted to quit or for any reason leave the lease, they'd hire somebody in our place and pay them wages, and then divide whatever it was. In other words, after we paid him his six dollars a day, then the average that came over that, we divided it. It came to so much a day, and each man had so many days, and he got his share of the pot, and he paid off whoever he had working for him. So I hired a man, and I think there were thirteen days left in September, because I told them, I says, "I'm going to be deputy mine inspector, and I'll hire Louie Lazarini to work for me." And during those few days, he made me a couple of thousand dollars there of profit, and that was that. But this stope developed into the biggest, most valuable pot of ore that had ever been found in the Bristol Mine.

They let my partners work until the end of their lease, and then they cut them out. They'd all made over \$50,000 apiece. It killed two of them; they drank themselves to death. And if I'd have been there, they wouldn't have cut us off, because Mr. Beuhler was the general manager, and they would at least have given me another three-month's option. But in not much more than a month, the six of them made around \$50,000 each, and then the company took the lease back. They

operated that for years and years and years. Every time I went back to inspect that mine, I'd go see my baby and the millions of dollars that I'd passed up, so that my son wouldn't have to get one leg shorter than the other going along the sidehills.

So did your part of the partnership end after September? You didn't get the \$50,000?

No, I was out. I just got whatever they got in the rest of September.



I'd like to go back and have you talk a little bit and describe some of the characters you met when you were mining in the early days as a youngster.

Well, unfortunately, I can't remember most of the good ones on short notice. One character we had in Pioche was named Dirty Curly. He was called Dirty Curly because he always appeared to be dirty, but he actually wasn't dirty. He just was unkempt. I forget Curly's name now, and I shouldn't forget it, because one of his brothers was a very prominent doctor in Cedar City, Utah. I went to him when I began to get cauliflower ears, and he took care of that, and I didn't get the cauliflowers.

Curly came from this very well-educated family, as I just mentioned. One brother was a doctor, others were professional men. Curly was a musician, and "John Barleycorn" got the best of him, and he finally wound up on the streets of Pioche. Curly had built himself a little cabin up there to live in down at the local garbage dump, made out of boards and whatever scrap he could find, and he found various beds. Actually, he had some pretty comfortable quarters, from his point of view.

Wherever you saw him—and he was the friendliest person, very well spoken, very well educated—he was always well dressed.

He had suit pants, white shirt, always a tie and a coat and always a hat. They were never pressed and not too clean, but . . . I won't say "not too clean," because he did wash his clothes. He just looked unkempt.

When he met a woman on the street—and he knew the name of every woman in town—he bowed, and he greeted them by their name and passed the time of day and was happy to see them. The ladies, I think, all of them would have liked to have taken him home and dressed him up with nice clothes, but, of course, that wasn't to happen. And the men all liked Curly; he was just so friendly and so well accepted. He loved to play the piano, and he was an excellent pianist. Probably, in his day, he was what we'd call a long-haired piano player.

He liked the classics?

Yes. There were pianos in some homes in Pioche in those days, but any saloon that was worthwhile, worth its name, had a player piano. He'd go in on occasions when there weren't too many people and ask if he could play the piano. Naturally, the owner or bartender, whoever was in charge, said, "Certainly!" Everybody liked to hear him play. The reason they didn't want him to play when the place was full was because they were in the business of selling food, and if Curly was playing the piano, everybody was around the piano. So that was the only way he'd get to play the piano.

We'll go back a little. At the Bristol Mine, they had a school, and they got a new school-teacher every year. The school board was composed of three of my dancing friends who were young married women, and, in fact, it was quite a congenial, young married group there of which I was a member, but I wasn't married. But every year, they'd get a school-teacher, and knowing that she had to be entertained and taken to the dances, as there was nothing else for her to do in this lonely mining camp, they sort of expected me to

squire the teacher. I wasn't the only eligible young man, but the only one that was associated, in a sense, with this young group. So when the applications came for the coming school year and they got the applications from the various applicants, they'd show me the picture and say, "Which one do you want?" and I'd pick the girl that looked the best or that I thought would be more fun. This particular year, 1934, they showed me the pictures, and one of them stood out.

I says, "Get that one." And they got that one, and when she came, a revolting development occurred. She was engaged to be married! That didn't make any difference, with the exception that she might not want to go to the dances with some strange man. It really didn't bother me. I didn't intend to jump anybody's claim or attempt to, but she was invited to the various parties, and I was invited. It was only natural, I assume, and particularly going to dances, because she was a beautiful dancer and I had a reputation, and we got along fine.

In fact, in those days, at the end of the dance, they'd have a prize waltz. That would be the ending of the dance. And the best waltzers always entered the contest. The couple that always won this prize waltz were named Albert and Della Delmu, and they were great friends of mine, too. They were ranching people. They owned the Delmu Ranch about eight or ten miles out of town. It was quite a ranching family. When my wife and I (who wasn't my wife yet) attended these dances, we began getting into this prize waltz, and as time went on, we were the only two couples left on the dance floor. We'd win it one week; the Delmu's would win it the other week. The judge would say, "You two really won, but we've got to be fair about this."

Your wife to be, what was her name?

Naomi Bremenkampf. Good German name. She was engaged to a very nice young

man who would graduate as an attorney. And he did and became a district attorney and, unfortunately, he passed away as a young man.

Naomi was a piano player. During a dance or right after a dance, this young group that I associated with would usually go somewhere or other and have a cocktail before starting out for our home mine, which was twenty-five miles from Pioche. The only places to go were in the saloons, and some of them had a nook back somewhere, where you could go and have a friendly drink. My wife didn't want to be associated with any bums that went into saloons, and the group was going into the saloon right next to the dance hall. Naomi said no, she didn't want to walk through there. We told her that there was a place in the back where they'd serve us, and she didn't have to be bothered with any bar stools or anything. To get there, we could go in the back door, and she wouldn't have to go through the crowd, so we did.

And toward the back was where the player piano was, and as we went in, Dirty Curly happened to be playing the piano. My wife just stopped, and she was just shocked that Curly was playing one of those long-haired tunes that nobody understood but everybody liked. Music is music, and if you like music, it comes out. And she was just stymied. She said, "Oh! Who's playing that piano?" And we told her about Dirty Curly. She later became acquainted with Dirty Curly. And he was very, very courteous, and he told her that he heard that she was a wonderful piano player.

Curly died, and when he died, he had the largest funeral of anyone I've ever seen in Pioche. High mining officials, high politicians—none of them ever had a funeral like Dirty Curly.



Let's go back now. I'm interested in how you and your wife ended up together.

Well, the schoolteacher was furnished a cabin, but she had no running water. She had to go to the nearest water supply to get water, and right across the street from her cabin was the home where my mother and family lived, so she used to come over there and get her water. If I was around, she made conversation. One day, going toward late fall, she said, "I understand you're quite a duck hunter."

I said, "Yes, I am. They call me the old duck hunter."

"Oh," she says, "I just love to hunt ducks."

I perked up my ears. I says, "Not often that one hears a woman likes to hunt ducks."

She says, "Oh, I just love to get out and watch the dawn break and listen to those ducks come in to the decoys, their wind whistling." Oh, I could tell that she was an experienced duck huntress.

I said, "Gee whiz!"

She said, "If you could arrange it, I'd certainly like to go on a duck hunt. I miss duck hunting."

I said, "Oh, hell, that can be arranged," because there were ducks all over that country—that is, not close, but within an hour or two of Pioche. I knew every duck spot, and I was the old duck hunter, and I was good at it, and I worked at it. So I made an appointment. "Oh," I said, "What kind of a gun do you shoot?"

She said, "Oh, any kind. Don't matter."

I says, "Well, would you like a twelve gauge or a sixteen or a twenty?" One's lighter than the other. I did know some old women that did like to hunt ducks, these old-time women. They could take a double barrel, and they mostly had hammers in those days. She said, "Oh, any kind. I can handle anything."

I said, "Well, is a twelve gauge too much for you?"

"Oh, no," she says, "I can handle a twelve gauge." So I had three or four extra guns, and I decided to take her to a place in Pahranaagat Valley. There were several lakes down there of various sizes, and the ducks,

in those days, were just plentiful. There were ducks all over. So on this day, I didn't have a dog, and I picked out a place by a cliff that was a good flight line for ducks. The lake had kind of dried up a little, and for the first hundred yards from this ledge was kind of thin mud. Since we didn't have a retriever, I didn't want to drop any ducks down there, because it would be too much trouble to get them.

So I told her, I said, "Don't shoot anything over that mud flat, because we can't get them." And jokingly, I said, "If you drop a duck over there, you go get it."

The first thing she did was drop a duck over there. I said, "Go get it." It was a big bull sprig.

She says, "Oh, well, you'll get it."

I says, "No." And I didn't. "I told you, don't drop a duck over there, or you'll go get it. You're going to go get it. I don't kill ducks for anything else and leave them. If I shoot it, I'll eat it." She finally went and got that duck. She was pretty muddy when she got back, and she was pretty aggravated, too.

Before we left, I'd bought a pint of rum, and the brand was Lazy Bones Rum. After we got through hunting, during which we didn't speak too often—she didn't get over that, having to retrieve that duck—we got in the car. I had a brand new Dodge sport coupe, and we had a few drinks. I'd taken lunch: sardines, crackers, whatnot. And we stopped by the side of the road and had lunch, and we didn't have much to drink. I hadn't thought about taking anything to drink, so I drank a few slugs of rum, and she didn't drink any rum. But by the time we were through lunch, we were on a talking basis again, and we decided to go on home.

I hadn't gone very far until I ran off the road. You may think you know what you're doing when you're driving under the influence, but you really don't. It wasn't serious, except I couldn't get back on the road. And there was very, very little traffic in those

days. I knew somebody would come along eventually, eventually somebody did, and it was a friend of mine who worked for the highway department. He had a big truck, and he stopped, and it was only a matter of a minute to get us back on the road. We started back for Pioche, and by the time we got to Pioche, we'd had a lot of serious talking and conversation. One thing and another, and darned if we didn't start just kind of going together a little bit more, and before you knew it, we decided to get married.

We had one complication: this was during the Depression, and married women were not hired to teach. If a single teacher married during her school year, they let her go. Jobs were too scarce to have a married woman doing the teaching. So we thought we'd better get married, because things were getting serious, but nobody must know about it. So one morning, bright and early, we got in my car, and we drove over to Parowan, Utah, which was a distance of about 130 miles. We went to the courthouse—by then it was late in the morning—and I bought a marriage license, and we asked for whoever did the marrying, I can't remember. I found out where his office was, and I went in, and this justice of the peace was also the county assessor. He had a couple in there with him, and they were in an argumentative mood. They were talking loudly back and forth to each other, and we stood in the doorway there, kind of lost. He finally looked out and says, "What do you want?"

I said, "Well, we want to get married."

He says, "I'm busy."

"Well," I said, "we've come a long way, and we'd certainly like to get married."

He says, "Do you have a license?"

I says, "Yes, we do."

"Do you have any witnesses?"

"No, we don't."

"Well, come on in." We went in, and he says, "Let's get this over with." He introduced this couple. I can't remember their name, of course, but I guess it's on our wedding cer-

tificate. He married us without any niceties about it. He wanted to get it over with, and he says, "All right, you're married." And he just ignored us.

I said, "Well, how much do I owe you?"

He said, "Not a damn thing. Just get out of here. I'm busy." And it developed that this couple that were there were large sheep owners, and he'd assessed them what they thought was too much, and they were objecting. So that's the history of our marriage.

And did you keep it quiet?

Well, we kept it quiet as long as we could—probably a week or more—but there was a woman lived right below her cabin and my mother's house, and she had to know. Her name was Susie. Her husband was the mine carpenter, and she was a very good cook. She knew everything that went on, and she saw me sneaking out of that schoolteacher's cabin about four o'clock one morning. Before anybody got in trouble, we had to admit that we were married.

We'd asked, when we were married, that this not be given out to the press. And he said, "Yes, that's all right. We'll take care of that." He probably didn't even know what we were talking about or paying attention to it.

But anyway, along about the time Susie decided there was something wrong with the schoolteacher, the *Salt Lake Tribune* came out, and there was our marriage. I tried to say, "Well, that isn't me. There's got to be another Art Bernard."

But they said, "Maybe there is. But there's not another woman with that name, Bremenkampf." [laughter] So we've been happy ever after.



Now, I would like to go back to talking about some of the mining characters. You told me earlier about one named Stumpy.

Yes. He was a little one-legged fellow, missing his right leg at the knee, and he was a very small man. I don't think he'd weigh over 125, 130 pounds. He was about five foot five or something. You really wouldn't expect that he could do a day's work in a mine, because mining is hard work, but he did, and he was a very well-spoken man, very intelligent. For some reason or other, he didn't get along too well with the other miners. He just wasn't the kind that went to town and got drunk or anything, so he didn't have very many friends. I liked him, and I'd spend as many evenings as I could with him out on the mine dump.

There were beautiful sunsets from this altitude where we were, and we could see hundreds of square miles of desert below us. He just loved to talk, and he evidently knew quite a bit about geology. He told me many times that one day there would be gold mined in this state, all over this state. He says, "You can go down on that flat anywhere and dig a hole and pan it, and you'll find gold. You'll pan some gold. It may be so infinitesimal that you can't see it, but it's there." He says, "Some day, they're going to figure out some way to mine that infinitesimal gold, and there's going to be a big boom in gold mining in Nevada." I'll never forget that, because it came to pass about twenty years ago; the open-pit mining started in this state twenty-five years ago. I don't know how much gold had been mined since those days, but when I was mine inspector, I wrote a paper for the American Mining Congress in Denver. I had done great research and had the production from every mining camp in the state. The Comstock had produced something a little over \$1.5 billion in gold and silver, and I often wondered how much has been produced in these open-pit mines since that time.

I'm sure that's a small amount compared to what they're doing right now.

I would imagine. I'm very interested. I'd like to know. When I went to work as a deputy inspector of mines in 1940, and we had the episode at Pearl Harbor in 1941, gold mining, as such, came to a stop in Nevada. They passed a law in the Congress to eliminate the mining of gold, because the gold was not necessary. Strategic minerals were, and the material was unavailable. The gold mines couldn't get anything. Labor became scarce. Everybody that could be called to the army went to the army.

When the Japanese attacked Pearl Harbor and L-208 came out of Washington and the materials for mining became not only scarce but practically unattainable, gold mines ceased to operate. The few that were still limping along on the Comstock had to close down. But mining copper got a shot in the arm, which started a boom in the Rio Tinto at Mountain City and, of course, in Ely, which was a large copper deposit, anyway. My job, then, was just to inspect mines to the best of my ability and see that the mining laws were not violated due to loss of material that may have been necessary for safety reasons.

So all your inspections were focused on safety, were they?

Yes, but I got along good with all the mine operators. I gave them a lot of good advice in my inspections. When I'd find something in a mine that was more or less detrimental to the safety of the men, that may not have been in the mining laws, I'd make suggestions. I found that every mine operator in the state was most cooperative. They were more interested in the safety of their men than the men were themselves. Practically every accident that occurred was due to miners themselves being careless and not observing the laws that were enacted to protect them.

What were some of the safety measures that you looked for back then? We talked about how some of the early hats were just cloth hats and so on. Did you have hard hats by now, steel-toed shoes, other safety measures?

By this time, all those things were coming into effect. In practically every mine, by then, the miners wore hard hats. Not as good as they are today, but they were an improvement over the soft hats.

Any other equipment that was for safety?

Well, I can't remember anything in particular. We just looked for safety measures, like making sure that there were cables and ropes around ore bins where the miner had to tie himself so that he couldn't be sucked into the ore chute. Various things, just common sense.

Now explain that to me a little bit: tie himself so he wouldn't be sucked into the ore chute. How does that work?

Well, around every mine or mill, there are chutes—and in the mines too—that are full of muck. Muck is the substance, the dirt, that the ore and everything is in. It is pulled out of a chute down below either on belts or by car somewhere and taken to the mill or the smelter. And this material, being packed together, creates a little hole up through the center and hangs up. Somebody has to get up on top and start it down with a bar or however they have to do it. There are many ways that they can get this muck started again, and when they do, it caves in, and if a man is on there without protection, he's sucked right into the middle of this mass of muck and ore.

Like a funnel, pulled down with it?

Right. And I'll bet you that 50 percent of the fatalities in the state are due to men being sucked into these cave-ins in the chute. So the law requires that there be a cable with a harness attached, and the cable attached to some safety measure. The guy that's doing the work is supposed to put on this harness, tie the rope safely, so that if the muck goes out beneath him, the rope will stop him, and the harness will stop him before he gets into this maelstrom that's going out. If they do that, they're safe. But most men—and I myself did the same thing when I was mining—think, "Well, I'll watch it." Fortunately, I never got caught. Some of my friends did. But various little things like that and being careful with dynamite and blasting and making sure that ladders were safe and in good condition, checking the ground and the stopes and the areas where they were getting out the ores to see that they were well timbered and that. There's just so many things that an inspector looks for. It isn't always necessarily a law that is written but common sense—and years of experience.

What was it about the job that interested you?

Oh, it was very interesting. Mining is one of the most interesting methods of making a living I've ever found. I never thought I'd ever want to get out of mining.

When you inspected, you lived in Ely. Did you inspect only a certain area, or all over the state?

I had half of the state. I had what was called the northern part, which was about 80 percent of the mines. I was traveling practically at all times, and my areas included all the mines in Pioche, everything north: Mountain City, the Victoria. Also the Nevada

Massachusetts up in Humboldt County, the Cordero Mine north of that, Ely. Everything north of Tonopah. I was on the road continuously, and I thoroughly enjoyed it, not only because I enjoyed inspecting the mines and enjoyed meeting with the mine operators and the miners and listening to what they had to tell me, but I got a lot of information from the miners themselves of what was going on in this one particular mine.

Everywhere I went I had to cross a creek, a duck marsh, sage-hen country, or pheasant country. I always had a gun in the car, and I always had a partner riding in the back seat.

Your partner, meaning your dog?

My partner had four feet.

So this was one of the side benefits of your job, right?

Yes.

You got to do plenty of duck hunting. And so you were deputy mine inspector for about how long?

A little over six years. In March of 1947, Matt Murphy, the state mine inspector, died, and I was appointed state mine inspector. Then I had the whole state under me. I still made many mine inspections myself, but I had two deputies. One took over my territory, and the other one took over the southern end of the state, which didn't amount to anything. All there was, was two or three little one- or two-man operations around Clark County and the big pit at Gabbs.

This was after the war, 1947. Was gold mining coming back then?

Not yet, no.

What was happening in mining around the state?

It was slowly dying. Most of the underground mines curtailed, and eventually most of them went out of business. Mining continued to be more expensive: material cost more, labor cost more, but the price of minerals went down. So, eventually, the only mines that were working were the pits in the Ely area, Gabbs, and a reoccurrence of pit mining in Virginia City. But mining was on a very small scale. Ely was copper, and Gabbs was magnesium. Virginia City, there was still the old gold and silver, but they were now pit mining where they'd mined underground before.

So pit mining was starting as early as the late 1940s, early 1950s, but not on a huge scale?

Well, yes, gold pit mining. I'd say it was about the 1960s before the gold really got started in the state.

Now, were you still mine inspector then in the 1960s when that all happened?

No, I was a state mine inspector until the end of 1950. Three and a half years. Then I went down and took over the prison.

You mentioned a couple of people that you knew who are famous to Nevada, and that's Wingfield and Getchell. Could you describe those two and your relationship with each of them?

Well, George Wingfield, of course, everything that you can think of has been written about him, good and bad. My relationship with George Wingfield and Noble Getchell was that they owned the Getchell Mine and Mill, north of Golconda. On one of my first inspections there, I found it very sloppily

controlled. They were just violating pretty near every mining safety law in the state. I found a young man there, a superintendent, and one that was a foreman. Our personalities clashed. I'd told him what I wanted done, and they didn't do it. The first thing that happened after that, I got a call, and they had a fatality, and when I went up, it was one of those ore-chute deals. I told them to put a cable and a rope and a harness, and they hadn't done it. A guy went in there and was killed.

We had a hell of a set-to, and I gave him strict, rigid instructions on what to do and how damn soon to do it. I said, "If you don't do it, I'm going to shut you down." So I went back right soon and made another inspection without giving them too much time to fool around, and they weren't doing it, so I just gave them orders that we'd stop those operations, and of course then they got very serious. Their chief engineer and geologist was named Roy Hardy, very important mining man, famous in this state. Noble Getchell and George Wingfield were the owners of the mine. So they called up Matt Murphy, and, of course, they believed their superintendent, everything he said.

They wanted Murphy to fire me. Murphy says, "I wouldn't fire Bernard. He's the best damn deputy inspector we've ever had in this state."

It was Getchell and Wingfield that called Matt Murphy and wanted you fired?

Yes. Well, I don't know who called. It was probably Hardy, because he was in charge; he was the manager. Matt said, "No way." He said, "I want a meeting up at your mine. I'll bring Bernard, and I'll come with him, and I want Hardy up there. Let's see what went on and what we're going to do." So we did. To make a long story short, after we got through inspecting the mine and what I had ordered done and what they hadn't done and

why they hadn't done it, Roy Hardy and I became the very best of friends—one of my best supporters during all the years I was warden, and a very prominent man. I had never met either Wingfield or Getchell, but over that escapade, I did, and we became the very best friends. They were two of my greatest supporters.

I don't know how to describe Wingfield exactly, but if you've ever met George Wingfield, you knew you were meeting a great man. He had a magnetism. Whatever has been said of George Wingfield, I found him to be a man, if he gave you his word, that's all there was to it. You didn't have to have a contract or anything in writing. His word was actually good. I later got in a mining partnership with him, and all we had was a word—my word and his word—and he never violated it.

Where was your mining partnership? Did you have a mine together?

Yes, we did. He and I and Matt Murphy. And Jim Greenen was the mining engineer. It was a talc mine down out of Lida. We had information that there was gold and silver there, and we went looking for it, and we found it, but it was just too small, and it didn't develop into anything. But I got very well acquainted with George Wingfield.

And what about Noble Getchell. Did you get to know him, too, through this process?

Oh, very well, yes. I was a guest at Getchell's quite often. In fact, while I was warden of the prison, and, of course, before, while I was still state mine inspector, I used to go in and have lunch with him as often as I could. They had a famous place there in the bank building, across from the Mapes on the corner. They had a luncheon spot there that was reserved for them and their guests. For years I went over and had lunch

with him when I could make it. I found Noble Getchell to be just as good a man of his word as George Wingfield. He, too, has been called a big crook and everything else, as most people who are successful are called crooks. They don't get there unless they're crooked. Doesn't matter how smart they are or how hard they work. The average person figures if they got anything, they stole it.

So you've read some of the things that have been written about Noble Getchell and George Wingfield. You don't agree with them?

A lot of it before I knew them, and a lot of it after I knew them. I don't agree with them, at all. I knew that in their days when they were young, they did what they had to do. I found them to be honest and honorable.

You became lifelong friends with them, did you?

Oh, yes. Lifelong friends.

Roy Hardy—you mentioned he was a very important mining man. Tell me a little bit more about him. I know he was in charge of the Getchell Mine. Is that right?

The mine and the mill. He was in charge of all their operations. Gosh, I don't know what to tell you about Roy, except that he was a very good man, a very smart man, a very important man, and a great engineer and geologist.

He was involved in mining from the early days of Tonopah and on until he retired. He became involved with Wingfield and Getchell in the early days, too.

Once you got into being a warden, did you stay involved in mining at all? Did you have mining claims?

No, I didn't. I got entirely out of mining. That prison took up all my time. I was on duty there twenty-four hours a day.

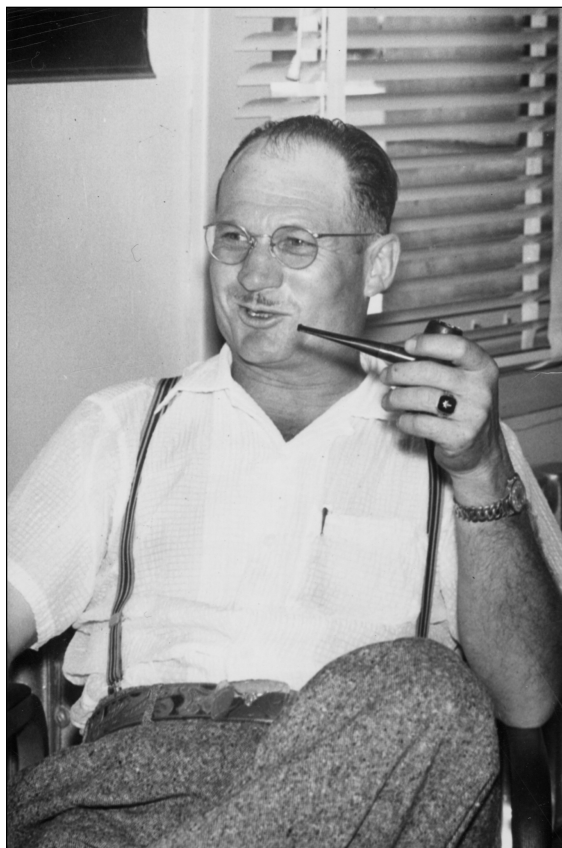
Completely changed your life then, right?

Yes. I got involved with the convicts and penology and all the things that they told me I couldn't do, and I did.

I had another question about mining. Was the Nevada Mining Association organized when you were a mine inspector?

It was organized before I was mine inspector.

And were you involved with them at all? Did you go to any of their meetings?



"That prison took up all my time." Art Bernard at his desk when he was warden.

No, except that I was friendly with all the officials, and at any meeting that they had, I probably attended. I can't remember them to any extent.

And what about the Mackay School of Mines. Did you have any connection with the university?

No, I didn't.

Now, you've told me about one project that you got involved with even after the state mine inspector and the prison, and that was the Nevada State Museum. Tell me about that project.

Well, when I moved to Carson City, I was friendly with Judge Guild [Clark J. Guild] at the museum. Anyway, the museum was his baby. He started it. And there had been talk about having a mining exhibit, and when I came along, it gave Judge Guild an opportunity to discuss it with me. They had just hired a new museum director, I guess, and his name was Tony Green. Judge Guild got the two of us together and told us what he would like to do, and he told Tony, he says, "Work with Art, and between the two of you, come up with something that we can have as a mine exhibit."

Colonel Fleischmann was one of the directors of the museum who had put up a lot of money and a lot of help for Guild and was deeply involved in improving this museum. Bill Donovan from Silver City had a mill and a mine, and he was on the board. There could have been somebody else, but I can't think of it now. But anyway, they turned over this mine exhibit to Tony and me. So Tony and I got together, and we decided, more or less, that we would build a replica, almost as exact as we could. And we checked our area downstairs, and we decided on just exactly what they've got there.

Now, we wanted to make it as natural, as authentic, as possible, so he would go with me on my inspection trips throughout the state, and we'd visit the various mines with the different mining methods. We'd tell the operator what we wanted, and then what help we could get, so everybody was cooperative as they could be. For instance, we had a place down in the museum where we thought we could have a certain type of a stope, and we'd try and get the exact material that was in place in the actual mine, but that wasn't used anymore, and we took that material—the timber—numbered them, and hauled them down to Carson City, and put them in place just as they were. We marked them.

We needed tuggers and scrapers. The museum didn't have any money to spend, so through my friendship with the operators, they agreed to give us anything that they possibly could at no expense. So everything you see down there has been donated by some mining company.

We put the actual workings in exactly as they should be, and we set up that man drilling in there and the hoist and everything. Absolutely to scale as they were in whatever mine that we got the equipment out of. And all the mining equipment on display was donated. I donated some myself, personally, that I had from my mining days.

Did you help actually build it, too, or did they have somebody that did that work?

We hired what we could, and I actually worked, and so did Tony, on a lot of it. Actually, Tony and I did that mine. I'm the last living man that was connected with that at the time. Jim Calhoun came after Tony Green, but the mine replica was already built by then. And that's a favorite with the school kids, too, to show them what mining's all about.



Judge Clark Guild and James Calhoun in Guild's Nevada State Museum Office.

When I was mine inspector, I had a wonderful collection of ores, various type of minerals, and I donated them to the Carson schools with the history. I imagine they're still around and being discussed.



Now, you have one son. He wasn't interested in mining, was he—or did you want him to be?

Well, I didn't want him to be, and he was interested in banking. I wanted him to be a lawyer, and I sent him to law school at Denver. He lasted a year, and he called me one day from Denver. "Dad," he says, "I just don't like this, and I'm never going to be a success at it. I hate to waste your money."

I said, "What do you want to do?"

He says, "I want to get into banking."

"Well," I said, "let's take care of that."

So I called a good friend in Reno who was in charge of the First National Bank at that time, Jordan Crouch. Anyhow, I could hear him over the phone say, "Oh, God, here's another one that . . ."

I started out with, "I have a son who wants to get into banking."

"Well," he says, "I don't know what we can do. Has he got a background? Is he going to college?"

"Oh," I said, "he graduated from college, and he just had a year of law school in Denver, but he wants to get into banking."

He says, "He's had a year of law school?"

"Yes."

He said, "Send him over, and just have him ask for me." So I sent him over when he got here, and they put him right up in

some department with a lot of responsibility.

You didn't want him to go into mining because it's a hard life?

Oh, it's a hard life. It's moving from here to there. Even if you're good, when you just about get your family settled, you get sent to another mine, another country, another state. You're always getting moved. But it's better than not having a good job.

So there were some hardships on your family, then, from moving around?

Well, yes.

But with going on to the state jobs, you managed to stay put for periods of time and to stay in Nevada. So that's a little different than some of the tramp miners.

Well, I was state mine inspector. Tin is an essential product in whatever tin is used in, in war. And during the war effort, they needed tin. Our sources in South America were gone, and they were looking for tin. Someone learned that there was a deposit up in Rabbithole, that they'd found tin.

Now where is that, Rabbithole?

Here's Lovelock, there's Gerlach, here's Winnemucca, and Rabbithole is right in the middle of that triangle. It's a desert. It actually could be called part of the Black Rock Desert. There was some gold mining and some mercury mining in that area—quite a bit of small stuff. So, naturally, the government was looking for tin, and Senator Scrugham, James Scrugham, and I had been friends for many years. He was one of the first men I met when I came to this state, and he was campaigning for reelection as governor—he was governor at that time.

In those days, the various candidates traveled in groups. All the Democrats got together, the governor, or the mine inspector, the state treasurer, and everybody, they'd have a big group, and they'd travel the state campaigning. They'd try to make every mine.

I was real new at the Bristol Mine yet at that time, and it was built on a dump. The bigger the dump got, the bigger the camp got. So the candidates would come up there. They had their envoys from every county who were familiar with the county politics and knew where to take them. And they'd come up, so the county chairman of the Democrats would get all the state officials and bring them up to the mine in the evening when they could meet most of the miners and other people, if there were any around. At that time, it was during prohibition, and all the candidates had their particular lackey that stayed with them. They'd have a box of cigars and a gallon of whiskey, and they'd meet the potential voter, and they'd give him a cigar, and they'd give him a drink, either or both. And, of course, "Vote for me. I'm the best man, blah, blah, blah, blah."

I was just a kind of a scared kid yet, and I didn't stay in the group with these people, because I knew I couldn't vote. So, I was over leaning against the boardinghouse on the dump, sort of leaning against it, and a fellow came over, a little dumpy looking fellow, and he had a box of cigars, and he says, "How you doing there?"

I told him, "All right."

He says, "Have a cigar."

I said, "I'm sorry, I don't vote."

He said, "I didn't ask you if you vote. I asked you to have a cigar. Do you smoke?"

I says, "Oh, yes."

He said, "Have a cigar." I had a cigar. He says, "My name is Jim Scrugham. I'm campaigning for reelection as governor. I'm sorry you can't vote for me, but maybe some day you will."

I said, "Well, I'll keep you in mind," you know, just talk is cheap. And by George, as time went on, Jim Scrugham and I became very good friends. I was always a great hunter, and I always managed to get into the best hunting places with the best hunting people. This family that I told you about, the Delmus, had ranching interests out north and east of Pioche, and they had one ranch up in the mountains about thirty or forty miles from town. It was an old homestead, and they had a nice meadow. Whoever homesteaded this, many, many years ago, built a home as good as they could and corals and barns. Of course, they couldn't make a living. They went broke, and eventually the Delmus bought it for a summer pasture. It was good deer country, so we used to go up there and shoot deer every fall, and the particular group, everybody could do something.

We eventually built a new ranch house, and it was actually a hunting lodge, but it was nice. Every fall, we'd go up, and we'd take friends that any of us had. Scrugham happened to be a friend of Joe Delmu. I met Scrugham two or three years after I originally saw him, and we got reacquainted, and he joked about the time that he came up and I said, "I can't vote." We became life-long friends. Every year, if he could make it, Scrugham came up and hunted deer with us.

So in 1941, after Pearl Harbor, they were looking for tin, and the word got out that they had this tin deposit up in the Rabbithole. Scrugham decided to go up and check it out. He took two of the best brains in the Bureau of Mines, both geologists and engineers, to check this out. One of them I knew; his name was Jim. Anyway, I met them at this little town out between Winnemucca and Lovelock. There's a little town in there, and I just can't remember it. It was an old railroad station many years ago. Anyway, the road to this area that we were going to took off there, so Scrugham had a

driver take him to Ely, and then from Ely, I took him in my car, and we went up to the Rabbithole and met all these others who came in with a guide to investigate this tin deposit that this prospector had.

Sure enough, in the various canyons at the bottom of the canyon In the olden days, there were quite a few little mines around; there were still cabins here and cabins there and cabins up here. The two geologists from the Bureau of Mines had somebody with them who was an expert at determining whether this gravel had tin and how much, by some kind of a method he had with some acids and whatnot.

By this time, we had quite a group of prospectors that came that knew this was going on. And we'd go to this canyon where this old prospector said there was tin, and we'd take up a sample. And this guy used some kind of a solution with zinc in it—I think they called it the zinc test—and it had so much tin, but not enough value in it. And we'd go up higher, because the tin was supposed to come from the top, be washed down. That's why you found gold in the bottom of a canyon. And you went up, and the higher you went, the more valuable it got. But in this tin case, the higher we went, the worse it got. When we finally got up to a certain elevation, there was no sign of tin at all. Go over to the next canyon, find the same thing, and the next canyon, the same thing. Spent all day there.

The crew was supposed to break up, and Scrugham was going back to Washington, the two engineers were going back to Washington, all the old prospectors were going back to their cabins, and I was going to take Scrugham back to Oreana, and someone would meet him there and take him to Las Vegas. Scrugham called the group together; he says, "Now, why do we find values at the bottom of the canyon, and the higher we go, the worse they get, and the values are supposed to come down?"

I didn't say anything. That was out of my scope. He nailed the two engineers. He was a very smart man. I was involved with him in a deal where he was the engineer of a mining company from New York, called the New York Mining Company, with some other initials there. They took a lease and option on some claims that we had a lease and option on, and nothing developed from them, but Jim and I got well acquainted, and I liked him, and he was a very smart man. He singled out these two men. He says, "Now, you are engineers and geologists. Explain this to me." Well, they just couldn't figure it out. He turned to me, he says, "Art, what do you think?"

I didn't know what to think. Christ sake, they're the best brains in the country, and they don't know. I sat there, and I thought, "Well, you know, I've talked to a lot of geologists in my time," and I thought for a minute, and I says, "Well, I'll tell you what, my impression is that it didn't come down. It came up."

He said, "What do you mean, it came up?"

I said, "One time this land was all covered with an ocean. There were undercurrents. The undercurrents wash and wash, and they washed ashore. They washed ashore, and they'll move anything. They'll move gravel, they'll move big boulders, they'll move anything in their way." I remembered old miners telling me these things about the desert, you know, guys like Stumpy. The more I talked, the more they were all listening, the more encouraged they got, the more encouraged I got, and I says, "And I think that's what happened. I think if we go down right in the middle of this flat anywhere and sink a shaft, we'll find tin. It might be too deep to go after, but that's where it came from, the bottom."

Scrugham turned around, and he says, "I bring the best brains in Washington, and a miner from Pioche has to tell me what's

happened." So I took Jim back, and when we got to Oreana, he says, "We're in the middle of a serious war."

And I said, "Do you think so?"

He says, "I think so. In fact, I know it." And he says, "We're losing ground all the time, and we're losing mines in the Philippines. We're losing railroads in France. Pretty soon, we're going to stop running, and we're going to come back, and we're going to start taking those things again. We're going to need somebody to run the mines; we're going to need somebody to run the railroads." And he says, "That's where you come in. I'll get you a commission in the army starting out as a major. Major. That's a good start. Within two years, you'll be a general. I'll see to that."

I said, "God, I've never even been a Boy Scout."

He said, "You don't have to be. You don't know what we're commissioning in this army. The dumbest clucks on earth are getting commissions in this army. We need men like you, because we're going to be taking back those mines in the Philippines, and we're going to need men to run them, and that's what you're going to be: one of the men that runs them."

"Gosh," I said, "Jim, I don't know." My oldest daughter was just about to be born.

He said, "I'll be in Las Vegas," and he gave me his address. "You tell me."

I said, "I'll talk this over." I thought, you know, this isn't going to be bad. Being a general isn't too bad. I went home all enthused, and my mother-in-law, who lived in Reno, happened to be visiting her daughter, because time was getting close.

I told them that I was going to be a general in the army, and Scrugham had labored it out. I was going to be a major, and then you have to be in so long before you can be promoted again, and so long before you can be promoted again. He figured it would take two years to go from major to general. He says, "I'll see that that happens."

Well, my wife started thinking about, "What am I going to do here with one child and one to come?"

And my mother-in-law laid in. She says, "All you want to do is go in and wear a uniform and show off, while my daughter is here on the verge of death."

Oh, Scrugham had told me, he says, "You're not too old. You could be drafted, be a G.I." So I called Scrugham and told him I couldn't take the appointment. And it's a funny thing. Along came a time when I got a notice from my draft board in Pioche to report to Salt Lake, Fort Douglass, to be examined for the army. I was thirty-four years old, I had a bad back, I had a nose I couldn't breathe through yet, then—I had it operated on since. I went on a bus with other inductees that picked me up in Ely, and they called me Grandpa before we got to Salt Lake. They were all eighteen, nineteen, twenty-year-old kids.

I was there two or three days, and I went through the mill. Half of these kids didn't make it. Christ, I passed 100 percent, and they had a lot of army officers and navy officers—doctors doing the inspecting. And the fellow that inspected my back was a lieutenant colonel in the army. I said, "God," I said, "I've got a bad back," and I did at that time. I was under industrial commission care, and I had more damned harnesses than a twenty-mule team that they'd bought me.

"Oh," he said, "you'll get over that." The next one that checked me was my nose. He was some damn thing in the navy. He wasn't an admiral, but he was pretty high.

I says, "I can't breathe." I noticed they'd been passing guys that couldn't breathe, guys with bad backs.

"Well," he said, "you're doing all right now."

We were sitting on a bench, a long bench, and just one after another after another after another. I was sitting there, and beside me was a young fellow about five foot five and five foot five around. Just a blob of a

young man with white skin and varicose veins as big as my fingers. One of these officials from the army was coming along and hitting us on the knees and checking our reflexes. Hit me on the right knee, hit me on the left leg. He hit this guy on the right knee, nothing happened. He hit him harder, nothing happened. He hit him hard enough to break his knee, and nothing happened. He went on. He passed.

With a broken knee cap, right?

[laughter] Damn near had. Anyhow, I passed with flying colors, and then I thought, "Well, now I'll call Scrugham and get that commission."

I called Scrugham; I couldn't get ahold of him. I couldn't make connection, but I got his chief of staff who knew me, and I told him what the problem was. He said, "Art, Jim can't help you. This is not supposed to get out. Please keep it under your hat." And he says, "He's going to die in a day or two." And he was. Somebody had him hidden out someplace around Las Vegas. He says, "He's in very bad shape," and he did die two or three, four days later. So I'm about to go into the army as a G.I., and I had a job as a deputy mine inspector. God, all I had to do was say I don't want to go, and I would have got a deferment. In fact, Joe Cohen, that brought me the shirt when I fought Jake Keele, was the chairman of the draft board, and along with this notice to appear was a note, "Art, if you want a deferment, just whistle."

And my wife says, "Well, that takes care of that."

I says, "No, by God, I'm going to go."

So I went to Salt Lake, I'm cleared for induction, and I got back to Ely, and the word got out that I was on my way to the front. I'd known the superintendent at some little mine in Osceola. He was superintendent of a small mine and mill, Ray Wimberly. He had been a captain in the reserve during that time, and now he'd been called in. He was

headed for Italy to do something, I don't know what. They were invading Italy at the time, and he said, "Art, I understand you're to be inducted."

I said, "Yes."

He says, "You speak Italian, don't you?"

I says, "Fluently."

He says, "God, I need you as an interpreter. I'll make arrangements that you're going with me as my interpreter."

I says, "That's just as good as any, as far as I'm concerned." And before he was called in, the war was over, so I missed going into the army.

THOMAS M. CAHILL

VICTORIA FORD [F]: *Today is March 10, 1999, and my name is Victoria Ford. I am here with Loretta Limon and Tom Cahill. Loretta is going to interview Tom about his experience in Nevada, especially about mining in Nevada.*

LORETTA LIMON [L]: *Let's start with the year and the date of your birth and where you were born.*

THOMAS M. CAHILL: I was born January 8, 1914, in Round Mountain, Nevada.

L: *Were you born in a hospital or at home?*

I think at home. There weren't any hospitals in Round Mountain.

L: *Were your parents also native Nevadans?*

My dad was a native Nevadan from Austin, Nevada, and my mother was born in northern California. My father was Thomas Nicholas Cahill, and my name is Thomas Martin. My mother's maiden name was Charlotte McGhan, but they called her Lottie.

My dad came from Austin to Round Mountain—it's only seventy miles—by way of Tonopah. My mother came to Round Mountain from Bishop, California.

L: *What brought them there?*

Her dad was a miner, and my dad was a miner, also. They met in Round Mountain when my dad was working there.

L: *What was your mom doing?*

Principally, raising children, I guess. She didn't work. She was a housewife.

L: *How did they meet each other? Did they ever tell their story of how they met?*

Well, it's just such a small town—not very hard to meet someone. But they had quite a social life in Round Mountain. A lot of dances, picnics, and so forth. But that's where and how they met.

They got married in 1910. I have a brother born in 1912, then I have a sister born in 1923. They are both still living.

L: So they had three children. What was your dad's occupation at the time he got married?

He worked at the mine, principally as hoist man. They call them a hoist engineer. They pull a cage up and down the shafts. Later on, he became a mine foreman there at Round Mountain. And then they had a large, hydraulic placer operation there, and he ran that right from the beginning.

L: What were they mining there?

Gold. Still mining gold in 1999.

L: What are some of your own earliest memories of Round Mountain?

Typical young people. I suppose a major contribution we made is that we built an Indian tepee one time. There's several small canyons around Round Mountain, and one time we had a twelve-foot-high tepee. Pretty good piece of work.

My mother went up in the hills and got the poles for it, in her spare time. [laughter] She didn't have any spare time. And I gathered scrap. Round Mountain used to be a tent town at one time. I went out and gathered scraps of canvas, and I did all the stitching to sew them all together. Eventually, it was made up into a thing that would cover the tepee.

L: Now, did you do the sewing yourself?

Exactly. You bet. [laughter]

L: [laughter] OK. That's a talent I didn't know you had.

Speaking of Indians, there was a pretty fair-sized colony of Indians in Round Mountain. My brother and I went to school with them. There was just one little school there for eight grades. About half of the students

were Indians. Some of them are still living, too.

L: Do you remember what tribe they were from?

Yes, they were the Paiute. It's from the Shoshone nation.

L: Do you remember any of the names of the ones you went to school with?

Oh, yes. There was a large tribe of Mikes—Mike's the last name. And Smiths and McCanns. Most of the Indians took their first and last names from white fellows that they admired in some way, or where the white people had done something good for them. They just adopted the names. That's the way they did it.

This will be interesting for you. They established camps. Usually old oil-drum cans nailed together would be the house, then all the outhouses would be the same. But if one of them died, why, they would completely level out the camp and move. They might only move five hundred feet, but they wouldn't stay in that camp. They still do that, too.

L: You mentioned that Round Mountain used to be a tent town. Can you backtrack?

Yes. Originally, after the discovery of gold was made, why, almost all of the Nevada mining towns were primarily tent towns for the first few months. Then, if the mine turned out to be of any value, they would build more substantial structures. Some of them even put up brick buildings. Have you been to Aurora?

F: No, I haven't, but I've seen pictures of it.

Virginia City, of course, is a prime example of solid structure. And Tonopah isn't too bad.

L: Do you remember the tents, or was that before you were born?

Oh, I remember two or three of them, but the town built up pretty fast. Now I have a picture of Round Mountain. The most people they ever had in Round Mountain, I guess, was about 450. That picture I have was taken in 1935. Well, let me point out the Indian camp there.

F: Oh, out to the edge was the camp. And this would have been the main street here?

That's the main street.

F: Where was your home?

Right here, but the place where my brother and I were born was right here.

F: Not far from the Indian camp?

We were in right here. And there's the school.

F: School was also on the edge of town?

Yes.

L: Can you think of anything else? Any other memories from your childhood growing up, say, before you went to school, or kids you might have played with, or things you might have done?

Well, it's a typical small-town life for the children growing up there. One recreation we had was riding wild burros, and we did that a lot. I don't know whether you are familiar with the burros' diet habits, but they very frequently ate the paper off the tin cans. That was one of their staples.

L: During your childhood years, did the Round Mountain mine continue to flourish?

It continued. It never did flourish very much, but it continued to operate steadily, you might say, from 1906 until about 1936, and then it was down for a good many years. When I came back in 1950 there was a big, well-financed company. They were financed by the Consolidated Gold Fields of South Africa (that's a big British company), and they put up the money. In effect, it was a dry-land dredge. They dug the material with power shovels onto the conveyor belts and conveyed it down to a central treatment plant. Everything was done on a large scale, very large scale. That was the Round Mountain Gold Dredging Company.

L: When you were a kid, what was it called?

It was called Round Mountain Mining Company. The fellow that discovered the property had gone to grammar school with my dad in Austin. Name is Louis D. Gordon. You've heard of him I'm sure, and he's quite a character. He was generally superintendent or manager there throughout the life of the thing.

L: So that's who your dad worked for? Your dad continued to work for the mine the whole time?

Yes.

L: Tell me about your school, what you can remember.

Well, they brought in some real nice teachers. Rita Cannan was one them. She was my first grade teacher.

L: She was the one that they named the school for here in Reno, correct?

That's the one, yes. She never married. Very fine lady. She is written up in your place

up there. There were two other very fine teachers from Round Mountain that I tried to find up there, but they're not included. Sadly, they are gone now. Christy McGillivray was one. She taught in Reno later on. Another one was Florence Gomm, and she was a sister to Roy Gomm.

L: So, what grades did you attend school when you were in Round Mountain?

Well, first to the eighth, but I skipped a couple.

L: Do you remember what year you started school?

I was five, so 1919.

L: And you went up to the eighth grade. What happened after the eighth grade?

We started the high school there. They had a little high school, but my dad had some relatives—his brother lived in Los Angeles—and he wanted us to go to a big high school. So we did; we went four years to Los Angeles.

L: So, you moved to Los Angeles?

No. My grandmother lived there and an aunt, but most of the time my brother and I lived in a rental, a rented room, so we didn't have to bother the relatives.

L: Were you and your brother in the same grade together?

Yes. I caught up with him in grammar school. He's two years older.

L: So, your folks sent you down to Los Angeles to go to school. And how was that? Gosh, you had to be really young. How old were you when you started?

Nineteen twenty-seven. How old would I be? Thirteen. I graduated when I was sixteen.

That was quite a strange experience for a couple of country boys. It was a large school, too. It was, I think, pretty close to three thousand students. It was Lincoln High School on North Broadway. That's a pretty tough part of town now.

L: Well, how would you and Bill get from Round Mountain to the high school?

We would drive down. My parents would drive, and they had a 1917 Dodge. It was dirt roads all the way.

F: All the way to Los Angeles?

Yes. You didn't get any pavement until you got about to Newhall.

F: Because cars were fairly new then?

Yes, they were.

L: How long would it take you?

Two days. We would stop in Bishop or Big Pine or Olancho, then camp overnight.

L: What do you mean camp overnight? You didn't stop in a motel?

We didn't have motels back in those days. They were all broken-down hotels.

L: Oh, OK. So you didn't stay in them. When you say you camped, what do you mean?

Well, all kinds of streams, you know, run into Owens Valley there, and you camped alongside of a stream. We just slept on the ground.

L: Oh, my goodness. Did both your mom and dad take you down there?

Yes, they did.

F: Did they stay with you?

No, no. They would go down, and they would, generally, drop me off with my Uncle Will, the one who was chief of detectives at one time. And then we would look for a room somewhere near Lincoln High School. Back in those days things were pretty cheap.

L: Do you recall what they would spend for your lodging?

It wasn't very much. It seems to me like we could get a room for \$20 a month, and then we would use meal tickets to eat in various little restaurants. You'd get a \$5 meal ticket for \$4.50.

L: So your mom and dad would come down, and they would set you up and get you the meal tickets?

No, they'd just drop us off at my Uncle Will's, and they'd go back home.

L: And then you'd get your meal tickets? You were thirteen, and Bill was what?

Fifteen.

L: And you would stay in a room, just the two of you? Wow, that's pretty incredible. What kind of a student were you in high school?

Pretty good student.

F: School was easy for you? Did you like school?

Oh, yes, yes. Bill was on the baseball team for a couple of years. The only athletics that I did was gymnastics.

L: Yes, and the rest of the time you studied? What were your favorite subjects?

I've always liked history for some reason. And math and physics, chemistry. They were good schools.

L: Do you have any memories of any events, activities that you attended when you were in high school, anything you did?

They had, just like in Reno here today, football and baseball and basketball and track.

L: Did you make a lot of friends down there, or did you and Bill kind of stay to yourself?

Yes. Oh, we had friends in school, but I would have to say that most of the children that we knew there, their financial situation wasn't much better than ours. It's pretty much the same.

L: So what are you saying? It was a financial burden on your parents when they sent you down there?

Well, of course it was. I didn't mention that my dad was a justice of the peace there in Round Mountain for over twenty years, and he had some extra income from the mine job. We worked every summer. Oddly enough, we made enough to pretty much support ourselves in school there.

F: This was before the Depression actually hit.

Yes, early 1927. It was pretty good times, economically.

F: Good times, but it was still hard to make a living?

Yes. The Depression really started in 1929 back East, but out in the West here we didn't notice it too much because the price of gold jumped up in 1931, I believe. So, it went from \$20 to \$35 about 1931.

L: I was going to get back to Lincoln High School. Do you remember any recreation? Did you go to dances and that sort of thing, or did you just study all the time?

Oh, no, there was no dances or anything down there. No, there was really no social life there like you would see in a little mining town like Round Mountain. You would probably get acquainted with most of your classmates, and that would be about it—and your teachers. That would be about the social life there.

L: Did your parents ever explain to you why they wanted you to go down to school there?

As a matter of fact, yes. My dad didn't like the school board that they had at Round Mountain, so he decided to do something about it. [laughter]

L: So, he took matters into his own hands? What about church, religion? Was that a big, important part of your life growing up?

Round Mountain didn't have any churches.

L: Were your parents religious people? Was church a big part of their lives, at all?

Well, yes, of course, it was. My parents were both religious people. But I might make a remark here that the only Nevada mining town I ever lived in that had more churches

than it had saloons was a place called Gabbs, Nevada. [laughter]

F: And it actually did have more churches?

That's true, it had a lot of churches.

F: That's interesting, because, usually, it's the other way around.

Oh, absolutely.

F: Did you have a traveling minister that came to Round Mountain, ever?

I'm sure they did, but I never met him.

L: And how about when you got down to Lincoln High School, did you and Bill attend church regularly down there?

Very regularly. I guess it's OK to bring religion into this. They were all very strict Catholics. Matter of fact, two of my Uncle Will's children became priests, and the third one became a doctor. But in Round Mountain, once in a great while there would be a priest come out from Tonopah, but not very often. I can't remember any other churches at all in Round Mountain.

L: When the priest came out, would your family attend church at Round Mountain?

Oh, yes. We had a little town hall there, and they would hold services there. The only times that I remember is when they came out for religious purposes that go in with the Catholic churches, like confirmation and so forth.

L: As long as we kind of jumped back to Round Mountain, how about traditions or holidays or celebrations? Did they have anything like that in Round Mountain?

Oh, yes. Well, they would have Fourth of July races and stuff like that, but, as a general rule, on the Fourth of July we would go to either Tonopah or Austin. Round Mountain had no celebrations on those days, but they had a lot of baseball games there in summertime. Austin, Tonopah, Goldfield, and Battle Mountain, and so on.

L: And how about holidays with your family? Did your family have any holiday traditions?

No. As a matter of fact, they used to say there at Round Mountain that you had two days off a year—this is the working people that had two days off. Fourth of July and Christmas, that was all.

L: So that was all your dad got off from work? Did he work seven days a week or five days a week?

In his case, they took us to Los Angeles, probably, three times, and he would have to take two or three days off, but most people there worked, as I say, everyday—except for Fourth of July and Christmas.

L: They didn't even get Sunday off?

No. Well, I think I can add a little spice here. One time we were all up at a picnic, and we heard a terrific boom downtown, which is about five miles away. So we all jumped in the cars and went back to town, and one of the miners had committed suicide. He decided he wanted to end it all, so he sat on a box of Giant powder and lit the fuse. He tried it once before, with less dynamite, but after he lit the fuse he got up and ran. The second time he stayed with it.

F: Did you see that as a child then? You said everybody went back to town. Did you see it?

Yes. We saw what was left of the poor fellow, and the biggest piece they found was a foot with a shoe on it. And then there was remnants of the poor guy scattered over a lot of roofs, and it broke almost every window in town. It was quite a blast.

F: Must have made a terrible impression on you, as a child?

No.

F: No? Wasn't that traumatic?

No. [laughter]

L: I think perhaps, maybe, in those days, the lives that you led, you took life and death for granted. Life was there, and death was just a part of life. And they were pretty rugged people.

I don't remember anybody being too sad about it.

L: Not too traumatized?

The fellow's name was Griffith. It doesn't matter now; he has no relatives that I know of there. He just got depressed and wanted to put an end to it, like a lot of people do. That was a unique way to do it. He wanted to be sure he did it right.

F: I was curious to know if your dad ever took you into the mine? Did your dad ever take you to work with him?

Oh, yes. We'd walk over the hill to visit him. He was in what they call the hoist engineer's house there. In there they had air compressors that made air to run the drills underground, and we were very interested in it. To get to the mine you had to walk over the hill. The mine was on one side of the hill, and the town was on the other side.

L: What did you think when you first saw the mine?

Well, the thing that a lot of people may not realize is that almost all mines—unlike Virginia City—if they have several miles of workings in them, they get very cold. The Round Mountain mines were, I would say, around forty-two degrees year-round. And that's the first thing I noticed when I did go underground—I can't remember what age I was—but it's cold all the time. In fact, I can remember in the summertime, when my brother and I would work on the hydraulic placer, we would sleep in the tunnels. You'd go into a nearby tunnel and sleep, just because it was so cool.

F: Did anybody live in the tunnels?

Well, no, not really.

F: Because I know, earlier on, some people used to make their homes in the tunnels.

Yes. Well, actually, there was a couple up there where you lived, Loretta. There was a tunnel up above your house there.

L: Shoshone Canyon?

Yes, Shoshone Canyon. The fellow lived there for a number of years in the tunnel.

L: You said that you and Bill were working the placer, when you'd come back from school in Los Angeles?

We worked all summer on the hydraulic placer.

L: Oh, in the mine? Even when you were thirteen?

No. This is not underground. This is on the surface.

L: On the surface, but when you were thirteen and fourteen?

Oh, yes. We got about three dollars and fifty cents a day. That's pretty good money. That was for eight hours.

F: Was the hydraulic placer operation going at the same time the underground was going?

Oh, yes.

F: Were they two separate businesses?

No. The hydraulic operations were way down the hill from the mine, so it didn't cause any water problem underground. They pretty much were separate. But my brother and I and two or three other young fellows worked on the placer operation. The main part of the job there was keeping rocks from going into the flume. They had a flume, three feet square, and it ran several thousand feet and emptied out into the valley there. They would turn the water off once in a while, and we'd have to go into the pit there and look for rocks and break rocks and so forth, stack them up.

L: Was that considered a safe job for kids?

As long as you didn't break any bones, yes. [laughter]

L: Sounds like it was pretty rigorous.

It was. [laughter] Where you hear about that mostly is penitentiaries, where the fellows are out breaking rocks. We were out doing the same thing, only we weren't in jail.

L: Do you think that's where you first decided that you were interested in mining, or do you remember when that was?

I just seem to have been born with an interest in mining. I never lost interest in it, either. I worked for some pretty low pay sometimes, but that had its good sides, too.

L: Can you explain to me a little bit about that job that you had there at the mine? What was it?

Hydraulic placer. I might start by saying that most of the hydraulic placer mining in the West here was down in California, because they had an adequate supply of water there at all times. But they had to give it up, because they were polluting the rivers with mud, mostly, just plain mud. So that was outlawed many years ago. But Nevada had only about two hydraulic mining operations that I know of, and Round Mountain was by far the largest.

We had water. The way we utilized it, we built a dam up above the town of Round Mountain, a pretty good-sized dam, and the water from these three streams—Shoshone, Jefferson, and Jett—would run into the dam, and then that would give you enough water to start up a couple of these hydraulic monitors. The water came out from a fifteen-inch pipeline that was reduced down eight inches at the nozzle. It was a pretty loud piece of machinery. It would make a tremendous roar. But they would tear down a placer bank, just like taking a fire hose and digging a hole in the mud or something, pretty similar.

F: How far did that go?

It would go between about 350 feet to 400 feet, depending on the angle that held the pipe.

L: How would they hold it? Would they hold it by hand?

No. The thing was counterbalanced. The thing is called a hydraulic monitor. That's

the correct expression for it. The pipe, if you can imagine a pipe fifteen feet long full of water, is a tremendous weight. So, they had a counterweight attached to the pipe, and a pretty good-sized box holding about, oh, perhaps, between a half a ton and a ton of rocks. And that would balance it, so that it was just like a fifteen-jewel watch; it was beautifully balanced. And the person operating it just had a handle there, and the nozzle could be deflected. He could just operate it, swing it around without any muscular effort at all, practically.

Anyhow, they would tear down the bank, and then they would sluice the bank down towards the head boxes of the flume. They had a flume several thousand feet long, three feet by three feet in cross section. And it had rails in the bottom of it, sometimes cross rails and sometimes lengthwise. The way they collected the gold was, up near the head boxes, as the water and dirt would run through the flume, the gold being heavier would drop to the bottom. And it was collected about once a week. They'd go along there and put mercury in the boxes, and it would amalgamate with the gold, and they would clean the boxes. The boxes were three by three by sixteen feet long, and they would clean about the first four boxes, take all the rails out, and manipulate the dirt. You've heard that mercury used to be a very fine metal. I like to say that now it wears a black hat. I worked in it myself for almost five years.

F: Did you have to be careful in working with mercury?

Oh, yes. Not so much, and usually you wore rubber gloves, but the fumes of it is what's bad.

L: Of course OSHA would have had a fit in those days.

Oh, these poor people now that are environmentalists, they detest the word "mine," I think.

F: But at that time you didn't have any regulations on this hydraulic work at all?

No. Very little of that mercury would ever escape from the boxes. We'd put, maybe, a hundred pounds of mercury in there and recover ninety-nine pounds of it. It just didn't get out of the vicinity. The sole purpose of it was to amalgamate with the gold.

To separate the gold from the mercury, first they would squeeze it in little leather bags, and then you put it in a retort, and this dries the mercury off. You collect the mercury now in a water-covered container. And then the gold would just be there in its native state, left in the retort.

L: How would they squeeze it?

By hand.

L: But they'd wear rubber gloves?

You can make a machine to squeeze it all right, but it's so much easier to get small bags. You squeeze it until it was . . . well, you've seen amalgamate in a dentist's office. Same thing, but on a bigger scale.

F: So the entire operation was shooting the rock down with water?

Yes. The banks are about a hundred feet high, and you just tear them down with the water.

F: And that went down the sluice box. And then that was it? There wasn't a mill?

Well, you had to turn the water off to get the rocks out of the pit, because you had to take them out manually. And sometimes we had cars to load them into and wheelbar-

rows and stuff like that. We probably looked like a bunch of ants, if you could have seen us from above, moving rocks out. And then, soon as the rocks were gone, you'd turn the water on again.

L: So that's what you and Bill did then? After they would hose down the bank, and the sluice would get filled up with rock, then you'd get down in there.

Well, a great many of the rocks, Loretta, would go right on out to the valley—or the slope of the mountains graded on into the valley. We wouldn't go out into the valley. We'd just end up in a pile of rocks. But rocks up to about a foot in diameter would go down the sluice box easily. And the ones we had were the ones that were two and three feet in diameter.

L: You must have had pretty awesome muscles. [laughter]

Yes, I did. Between the gymnastics and the placer work, both Bill and I had pretty good muscles, but they disappeared over the years.

L: That was real hard rock mining.

You've got to break them up with a hammer, or if the rocks were too big, you'd drill them and blast them, break them up into smaller pieces.

L: Did you and Bill actually drill and blast?

No. Most of the men on the crew there were Indians. And Bill and I and probably two or three others were non-Indian. They had a couple of good Indians there with jackhammers, and they'd drill the hole. It's not a deep hole, and it would shatter the rock. Put a half a stick of dynamite in it.

F: Tell me, was your father involved in that and the underground mine? Could you tell me a little bit more?

At different times, yes. See, the hydraulic placer mine had to be seasonal, because we had to wait until spring for the snow to melt to bring the water in. So, he was for a time there working both jobs.

F: And you worked for him when you were doing this job?

Yes.

F: Did you ever work underground for him?

No.

L: At that point in time did they have any restrictions about young kids going underground, or did it matter?

There was no written restrictions that I know of, but they didn't want to see anybody down there unless he was eighteen.

L: What year did you graduate from Lincoln High?

Nineteen-thirty.

L: Do you remember if your parents came down for graduation?

No, they didn't. I had two uncles down there, George and Will, and they both came to the graduation. After graduation, it was back to the hydraulic mine, as I remember. And then the very first year, I entered the University of Nevada, September 1930. I was sixteen.

L: At that point in time did you declare a major? Tell us a little bit about college.

Yes. My dad didn't want me to be a mining engineer, so we settled on electrical engineering, but the first two years in engineering courses are the same. Same basic math, and more math and physics, chemistry. At the end of my second year we had another talk, and he was in failing health at that time.

L: How did you convince him mining was for you?

Oh, well, I don't remember how the argument went, but anyhow, he finally agreed that I should take what I wanted to take. He had me so convinced that I took the entrance exam at Cal Tech, to take electrical engineering, and I passed it with a good grade, but I never did enroll there. That's a place for a rich man. Cal Tech and Massachusetts Tech are pretty expensive.

F: How did you pay for the university here?

It didn't cost much to go. You know, there was absolutely no tuition, at all. And I was thinking about it just the other day. If I remember right, Lincoln Hall was twenty-five dollars a semester. I could be wrong on this, but that's my best recollection. And the dining hall was twenty or twenty-five a month for three meals.

L: So, how did the financing go for your college education?

Well, there again, we earned a pretty good piece of it working in the placer. And my dad put up what he could the first three years. My dad passed away fairly young at fifty-four.

F: Did he have any health problems from mining?

No. It was cancer caused by chewing tobacco use. Of course, back in those days they thought it was candy, I guess. It's sad but true.

L: Going back to college. What are your recollections of the University of Nevada?

Oh, I liked it. I really did. I don't know what, especially, though, I liked about it, but it was a nice place to be. Reno at that time was between eighteen and twenty thousand people, and there were probably as many as six or eight automobiles on the campus. A little difference, isn't there? And a couple of the boys had motorcycles. But when we would want to go to town, we'd walk, and that's the only way to get there. Although, if we had a rich guy in the crowd, sometimes we'd hire a taxi. Twenty-five cents for whatever you could cram into a taxi.

L: All the way from UNR to downtown. What buildings were on the campus then? Do you remember?

Well, I've got a picture in front of me here, so I'll recite. Starting on Virginia Street: Manzanita Hall, Manzanita Lake. Then there was an Artemisia Hall that has now been torn down and replaced by some other thing. Lincoln Hall is still there. The old infirmary. I'm going around in a circle here now. Getting over here on to the Quad, the old gymnasium is where the present library is situated. And then there is Mackay School of Mines. And then starting down the Quad, there's a mechanical engineering building. Then there's a little building here where the employees on the cleaning and maintenance for the university worked, and then there's a science hall, and then the president of the university has a residence. I don't know if you saw that or not.

F: Oh, right in front of the science hall. And you said which buildings were new, the year that you went there?

The big science hall, 1930. Mackay Science Hall, yes. Morrill Hall was there, and there was a Stewart Hall there, too. It was very close to Morrill Hall. You know where they put up all of these new concrete pillars with names on them [the Honor Court]? That's where Stewart Hall used to sit, and the main function of Stewart Hall was for the ROTC for military use.

L: And what about Clark Hall, was that the library? Was that there then?

I don't know whether it was called Clark Hall back in those days or not. It was the library building.

L: So, that was what the campus looked like when you were going to school. You said you started in 1930, and by that time everywhere else people were having a Depression. Did that have any effect on you going to college?

No, I don't think so. I didn't really realize they were having a Depression, because my brother and I both had access to summer jobs at the mine there, on the placer. I didn't really become fully conscious of the Depression until 1934, and that's when my dad began to get ill and family money was getting short and everything. To make a long story short, that's why I had to drop out of the university after three and a half years, to help support the family.

L: So you went to the university for three and a half years majoring in mining engineering, but in 1934 you dropped out, and what happened then?

What happened then was I went to Virginia City to look for a job. And that's where you really began to realize that we were in the middle of a Depression, because there was about six, or maybe eight, properties trying to mine gold up there, principally at the south end of the lode. The biggest one I can remember was the Dayton Consolidated, which had the biggest payroll. I worked there maybe three or four times. I'd maybe get one or two or three days work and then have to go look somewhere else, for the simple reason that there were so many people looking for work. You had to say that for the old mine owners back in those days—they were trying to look out for the family man who had the most responsibility, family wise. Sad in a way, but . . .

L: So what would they do? How would they look out for them?

They would hire them for a few days, so they would get enough money to feed their children.

F: So if you had a job, you didn't just go to that job seven days a week? You had to go there every day to see if you could work?

Sure. That's right.

F: Did people line up? How did that work?

Well, there was always some of those fellows that leave home, if they had a home or tent, whatever they might have had, at six o'clock and get down to the collar of the mine shaft around eight, and then they would put their names in. The mine foreman would hire maybe three or four out of a hundred. That's the way it worked.

F: Where were you staying at that time?

The hotel is still there. Loretta has stayed in it. It used to be the Molinelli Hotel, at that time. It was a little two-story hotel, right next door to the big, old, five-or-six-story hotel that burned down.

But the way we worked that, there was six of us young mining engineers (I considered myself a mining engineer at that time) living in one room, in the front room there, and we'd take turns. Some of them were fortunate enough to have jobs steadier than mine, but we never had any more than three in there at any one time. But there was six of us actually paying the rent. [laughter]

L: Do you remember the names of any of them?

Oh, yes. I know all of them. One of them went to Stanford, but in later years he was president of the U.S. Borax Corporation. And then one of them was Pat Willard, who later became the manager out at Basic [Refractories] before I went out there. He was in the Honorary Mining Fraternity. And Jerry Delaroy—I don't know what happened to him. Anyhow, there was six of us. Oh, Mike Gould was another one. Mike Gould had a steady job. He was sampling some of the old dumps. They were all, more or less, classmates, except for Kendall.

L: So the six of you had this room and shared the rent. For how long did you do this?

I went up there in March of 1934 and was only in the hotel for one month, lived elsewhere afterwards. I left in September. And I went from there to Jackson, California. I think I mentioned that the general pay on a lode up there was three and a half to four and a half, depending on what you were doing.

F: What kinds of jobs would you get when you lined up?

Most of it was underground mucking, with a shovel.

L: You were an underground mucker, too, even though you were an engineer? You just took the job?

Well, we know from previous discussion, I didn't have a degree; all the rest of them did, but I never worked in anything except mining.

L: So you went in, and you just mucked along with the other guys?

That's right.

L: For three and a half to four dollars a day?

If you went underground, it was at least four.

L: What about the safety issues?

Well, mining has always been fairly safe. One of the skilled jobs there is a timberman; another one is after the blast, they install the timber and everything before anybody goes in, if it required timbering. Some mines don't require any timber, and some require a lot.

The mine that had the biggest crew at that time was the Dayton Consolidated, but I worked at all of them. There was the Consolidated Chollar and the Overman, and these are all down towards the south end of the lode. The mines at the northern end of the lode where the big bonanza was—there was nothing doing up there. Nothing.

If the placer mining at Round Mountain was not a seasonal thing, well, I think that would have been a lot better to stay, because

they worked year-round for a good many years until 1936. Then they shut down.

L: But you chose to stay in Virginia City. You didn't want to go back out to Round Mountain?

Well, I had a sort of steady job there, when I first went to Virginia City. My last semester at school I had designed a little mill for the Hartford Mine. And Mr. Drysdale, who was the owner of the Hartford, said that he'd like to have me come up there and go right to work. But unfortunately he ran out of money, too. That's the way life was. We did get the mill built, finally, and it worked for a couple years.

F: A mill that you designed?

A cyanide mill, yes. It was called the Hartford Mining Company. The general manager was a Mr. Drysdale. We used to go up there quite a bit when we were students. I had a roommate that had a little Model-A car, and we'd run up there almost every weekend. Incidentally, I'd like to mention this roommate of mine—his name is Morgan North. He tried mining, but he couldn't pass any of the math courses. He had trouble with math and physics. But his folks were quite wealthy. He became a printer.

L: Could you take a minute and describe to me the mill that you designed? Was it different from other mills? What was unique about it?

Well, I don't think we're quite that far along yet. Right after I mentioned that I went from Virginia City down to Jackson, California, which is on the mother lode in California, I worked there at the Kennedy Mine, which is one of the largest in Jackson, but they had real cheap wages there, \$2.75 a day, for a ten-hour day. I was working out

there. We were putting in what you call a tailings race, a wooden flume. And anyhow, very shortly after that I went back to Round Mountain. It was 1936. It was a big company from Milwaukee that was looking for a gold mine in the West here, and they had the biggest crew we ever had at Round Mountain.

We were working for A. O. Smith. I was fortunate enough to be in the engineering office, and in fact, I was the head man in the engineering office. We had about ten people that were making maps and so forth. After they finished sampling that, well, they asked me if I'd like to go to Central America and do some more looking for gold mines, so that was my first trip down south. Went to El Salvador, which used to have some pretty fine old gold mines. There was a couple of mills in Virginia City that are named after a fellow that was down there.

Principal work there was mine examination. We went to a couple of old well-known gold districts, and they were thinking of reviving them. The principal work we were doing was cutting samples and assaying the samples. Incidentally, the fellow I went down with was named Jack Knaebel, and he later became the senior vice-president for Anaconda Copper—a very intelligent engineer, very smart.

I think I was down there five or six months. We both got sick down there. We all got malaria and hookworm and dysentery—all at the same time. It was pretty rough. We didn't have any established camp. This was an old abandoned camp. Very primitive.

L: How did you get down there?

We went down on a cruise ship. *Santa Elena* was the name of the cruise ship. It came to its demise down there in North Africa during the war. when they sunk it off the coast. It was a nice ship, though.

L: So you went down in luxury? [laughter]

Sure did.

L: And then how did you travel when you were down in El Salvador? By foot, horse, donkey?

By car. We went from San Salvador, the main city, out to a place called Onjan and Marañan. And this is over towards Guatemala. El Salvador is a very small country—it's the smallest country down there and the heaviest population—and we were out in the sticks there. Anyhow, we finished sampling the mine and came back.

I was pretty sick for quite a while. No fun. When we came back I went to the old Stanford Lane Hospital in San Francisco. They had at that time found a new cure for malaria, called Atabrine (a brand of quina-crine). It turned just the same color as that chair there, your skin was just the color of that—yellow—but it worked. Have you ever had Atabrine? They still use it.

L: So your malaria was of such intensity that you brought it back with you?

Oh, yes. And as a matter of fact, it repeats every year. You get chills and fever for about a couple of weeks.

F: You still get it?

No. For about seven years, though, I did. I was only in the hospital for about four days, but I can remember coming back to Reno with really yellow skin. People didn't want to sit close to me. Pretty bright colored. [laughter] That's about 1938, as I recollect.

L: So you're back in Reno, 1938. Where did you go from there?

We bought a little house. My dad had passed away in May of that year, and we bought a little house for my mother and sister here in Reno. You know where Buena Vista is? It was a little shack up there. Nice little house. So my mother and sister lived there. That's when I went out to Nivloc, Silver Peak. And I was there for an even year as an assayer. There was a silver mine. Productive little mine, too.

F: Did you live right at the mine?

Yes. They had nice housing out there. We had a staff house, which is a step above a bunkhouse. It's where they had all of the so-called staff—the engineers, assayers, and the head bookkeepers, for those who were not married—the unmarried stayed there, and the mine shifters, the foreman, underground shifters, and so on.

L: So in 1938 were they still feeling the effects of the Depression?

Oh, yes, but it began to look better. As I recollect that was a very steady job at Nivloc. Cord was working, had a big operation there.

F: Yes, the Cord Mill. You and I talked earlier about Vic Kral.

Yes, you said Vic Kral was out there.

F: And he was a classmate of yours at the Mackay School of Mines?

Yes, that's right. I think I mentioned, if my memory serves me right, Vic and I and possibly one or two others are the only ones still existing. Two of them were killed over in the Philippines when they were working there. They were killed riding down in the shaft. Nobody ever got the straight story, but they were decapitated. Fellow named Hawkins and one named White. Classmates, both of them.

L: You were in Silver Peak at that time in 1938. Was Round Mountain still flourishing? Were there any other mines around that were still flourishing in that general area?

Well, Silver Peak was a pretty lively place for a mining camp. They were doing a little bit of trying to reinstitute a mining industry in Goldfield, but that was a pretty small deal. Let me think.

L: Anything in the Candelaria area or Mina, Luning?

That was a ghost town.

F: Was anything happening at Weepah?

Weepah was discovered in 1927, and it had a very brief and flashy existence. There was one at Northumberland. That's out near Round Mountain.

L: Do you know what they're mining out there?

Gold.

L: And Round Mountain was still going in 1936?

Yes, but it's in the process of pretty well shutting down. And it didn't really open up, on a big scale, until 1950. That's when I went back there.

L: So you were out at Nivloc?

One year. April of 1938 until April of 1939.

L: Was there a lot of population out there at Silver Peak? A lot of people? A lot of miners?



“Well, Silver Peak was a pretty lively place for a mining camp.” Silver Peak in the late 1930s.

Yes, it was a pretty good-size town. And I don’t know, but on the various payrolls out there, there was probably as many as five to six hundred men working. This is only a recollection. I hope it’s fairly close.

F: From what I understand, the Depression just did not hurt Silver Peak. That’s one of the few places where there were good jobs available.

Yes, that’s right. Mining was very quiet in the latter 1930s there. There probably was a mine working up in Battle Mountain, I would think. Anyhow, mining was quiet. But I was over in the Philippines. I was sent over there from Round Mountain by the A. O. Smith Corporation, and this was before I went to El Salvador. This fellow, Knaebel, that I mentioned before, was manager of an

operation there, on the island of Mindanao in the Philippines. And they built a cyanide plant. It wasn’t working too well. They knew I had a little bit of experience with designing cyanide plants, so they asked me to go over and take a look at it, so I was over there about three weeks, went over there by ship. One of the Dollar liners, I was on that one. There about three weeks, then when I came back, I went to El Salvador. This had to have been in late 1938, I guess.

F: Tell me about your experience with cyanide plants, because you’ve mentioned designing one.

Well, this fellow, Mr. Drysdale, must have thought I was a bright, young fellow, because he asked me to design this plant while I was still in school. I didn’t really know that much

about it, but I studied it quite a bit at that time. I guess I had a fellow named Charlie Chafin that was kind of pushing my reputation at that time, which wasn't very much.

L: Tell us about your design.

Oh, no. It's pretty boring stuff. That's another thing wearing a black hat nowadays, too.

F: Was the design of that cyanide mill any different than any others?

No, no. They're all pretty standard. They have a coarse crusher, and then they have a fine grinding section. The rock comes out of the mine up to perhaps a foot in diameter, and the primary crusher reduces that down to about two inches. Then it goes into a ball mill or similar grinding unit. Ultimately it ends up in the cyanide tanks, usually in what they call a thickener first and then into the agitators, then to the filters, and then precipitation.

F: So it was pretty standard for that technology?

All very standard, yes.

F: One of the first cyanide mills that I got to see were the remains of the E. L. Cord Mill outside of Silver Peak, where Vic Kral worked.

You didn't go up to Nivloc?

F: No. I didn't get up to Nivloc, so I haven't seen that, but I've heard a lot about it. I don't know what's left up there, if anything.

I know. I have never been back.

F: You were doing assaying there?

Yes. And then after we left Silver Peak I went to work for a very short time assaying over at the White Caps Mine, in Manhattan. That was during 1939. Assaying was something I learned in college there. It's a standard course.

F: So, now you're finally getting to use your college education, right? You're not mucking any more?

No. Well, I was using my education everywhere I went.

F: You had learned both gold and silver assaying at Mackay?

Yes. Of course, if you take enough chemistry in your college courses, then you can assay, or you can do what they call quantitative analysis. In chemistry you can analyze anything for any metal. It's just a matter of staying with it.

L: What mine was it in Manhattan?

The White Caps. That was the largest producer, in the past, in Manhattan. Manhattan was strictly a gold camp.

L: Who was the owner of that mine? Do you remember?

At that time, Charlie Chafin had it under lease. The people who owned it for a good many years were the people who had the Tonopah Extension where Tony's dad worked. The name was Kirchen. Well, you remember Bill Kirchen. The Kirchens had a lot to do with operations at the White Caps. They had a big mine in Tonopah, the Tonopah Extension. One of the Kirchens later got into my family and married a cousin of mine. Anyhow, after assaying up there, then I went into the mercury business, And

I was in there, on and off, for about a total of five years. Went down to the Coast Range in California, and Morgan North and I got a mine. And John Cavanaugh also put some money into that. It was a mercury mine in Lake County. It didn't work out very good. [laughter] It was a loser right from the start.

F: Why was it a loser?

Any mine is pretty much dependent on the price of the metal at any given time, and if the price is high enough, you can make money out of almost anything, and vice versa. But the price of mercury was on a downward spiral at that time.

F: This is right when the war was starting, is that right, over in Europe?

That's right.

F: But the price of mercury was down?

It was down, but it went up. It was vacillating quite a bit, but it went up and stayed up during, I would say, 1940, 1941, 1942, and 1943. And then I came back to Nevada and went to work at a place called Mina Mercury. This was about latter 1939, early 1940. I was there for about two and a half years. It was a very productive little mine. It just made a lot of money for the owners. I was superintendent of that operation there during, say, part of 1939, 1940, 1941. I was there a little over two years. It was east of Mina up in the mountain there.

F: And you were superintendent? How many men did you have working for you?

That was about thirty-five all together. It was a small operation. We had a nice little mercury plant there. And then that's the time we got into the war. It happened right

after Pearl Harbor. I worked for the Bureau of Mines for a short time, then I joined the army engineers as a civilian employee. They had about maybe thirty mining engineers evaluating mineral properties on lands that were withdrawn for bombing and strafing ranges. Tonopah Air Base is one of them, and we had a bunch of engineers out there. I didn't go out there. I was mostly in Arizona and New Mexico and part of Utah.

We were evaluating mining claims on areas that had been withdrawn for bombing and strafing ranges. The purpose of it was to pay the owners of these mines what the hole in the ground was worth. Most times it wasn't worth anything.

F: Going back to the mercury mine at Mina, where you were superintendent—you mentioned a couple of things about the grade values in that mine.

It was a very small mine as mines go, but it was highly productive because it was such high-grade ore. And I think we mentioned that the owners of that were two mining engineers. Mr. A. J. Anderson, who originally graduated from the University of California, and the other one was L.B. Spencer, and he graduated from Stanford, I think. I don't know what year, but it was way back. And they did very well financially at that mine, but it didn't last long—about two and a half years. Then the ore was depleted.

F: And do you have an estimate of about what you think they made on that mine?

I would hesitate to say because the price of mercury varied so much over a period of months. It was in the neighborhood of, let's say, a million dollars.

F: And that was pretty good during that time, was it?

During that time it was pretty fair income.

F: And you were there about two and a half years, and then it was World War II that started to change things after that for you?

Yes. You either went in the service, or you were in a business that was directly related to strategic items. In this particular case, it was strategic metals. The way it ended up for me was building plants for mercury, which at that time was a highly strategic metal. And during that time I went to Alaska and to Peru to put up plants. We were in southwest Alaska on the Kuskokwim River. It's the second largest river in Alaska, next to the Yukon.

F: And you put up a mercury plant there? Was that something that you designed?

No. It was a pretty standard design, and I was working for the firm that developed the plants. They sent me up there. I was construction superintendent. It was for H. W. Gould and Company, San Francisco.

F: Was it the same company that sent you to Peru?

Yes, except I was reporting to the Peruvian company. I was just sent down there to build the plant. I was down there four years and came back about 1947. The reason I was there in Peru for four years was because during those days shipping was a pretty hazardous business, and getting machinery down there was a very slow process.

F: When you went down there, did you expect to be there for four years?

No. It was about, at maximum, a two-year thing, but it was a big job. We put in an auxiliary hydroelectric plant with all of these

waterways and so forth. This was built up in the Andes in Peru; it was pretty rugged country. The elevation where we lived was about 14,000, and where the job was, it was up to slightly over 16,000.

F: Did you have to make some special concessions about that elevation?

No. Fortunately, I wasn't bothered any from a health standpoint, but in later years I found out I should have been wearing dark glasses all the time while I was down there—eye protection—and I did not wear any.

F: So it did some damage to your eyes?

Yes.

F: Did your family go with you?

No. I had two wives, and the first wife was with me down there. And my daughter, Loretta's stepsister, was born down there in Peru.

L: So were you in Peru all during World War II?

Yes. There and in Alaska.

F: Did you see any impact from World War II in Peru?

I don't think so. The only impact I was aware of was that up in the mountains where the plant was built there were two German doctors who had escaped from Hitler dominating Germany. As far as impacts are concerned, I think that's the only one I noticed.

F: Was that the reason why it was difficult to get machinery there?

Oh, of course, because there were submarines operating even on the West Coast

at that time. There were both Japanese and Germans.

F: So, it was more a matter of transportation?

Well, I never did get the straight story on it, but we lost the first shipment of furnaces. It went down there. It was sunk. I don't know how or why, but that's the reason I was there so long, waiting for machinery.

L: What was it like to live down there in Peru?

Well, the foreign engineers lived pretty well. They had real decent housing. As a matter of fact, I had access to a house in Huancavelica, Peru, and also in Lima. We had a house in Lima fully staffed with outside help. And it's a different lifestyle than here.

F: You enjoyed that?

No, not really. It's like watching so many children. They're very nice people. I like them, but to me it was like having extra responsibilities around, such as a form of children or something. Some people enjoy having a house full of servants, but I didn't.

L: What year was it when you came back up?

Nineteen forty-seven, I would say.

L: During that time was Tommy in school?

No, Tommy was born when I was up in Alaska, which was 1943. His sister was born in Peru in 1945. We came back approximately 1947.

L: So he hadn't started school, because he was only four.

Oh, he was pretty young.

F: What job did you go to when you came back from Peru?

When I came back from Peru there didn't seem to be too many mining jobs, so I went to work on a waterfront on a pile-driving job—the only time I ever got out of mining. And that lasted about six to eight months.

F: So when you came back there was a shortage of jobs because of all the returning veterans?

Well, of course, the metals that had been very high on the list of strategic metals were nowhere near as important at that time, and as a consequence mining was suffering a little bit. General industry was.

F: What was needed at that point, in terms of mining?

Well, I never gave it that much thought, but I would assume any industrial metals, such as copper and nickel, were still high. Anything that was alloyed with steel products would have been very high on the wanted list.

F: One of the things that I learned in working on the Silver Peak project was that a lot of people had originally thought that the gold mines would reopen once the war was over, but there was evidently some difficulty with that.

Yes. Let's see, the price of gold went from twenty to thirty-five approximately in 1932. Does that sound right?

F: That sounds about right. Yes.

Yes. Then it went from thirty-five; it started climbing. I can't tell you exactly when it was, but it climbed up to approxi-

mately eight hundred dollars for a short time there. It was in the early 1950s when they started mining gold on a very large scale here in Nevada. And I'm assuming that you're aware that Nevada is one of the largest producing gold places in the world. They rank three right now behind Australia and South Africa. Not in that order—South Africa is the biggest.

L: How were you transported from Peru back to the United States? Did you fly? And did they fly all your household goods and whatnot?

Oh, we flew. We didn't have any household goods down there. While we were in Peru we purchased some silver, and Peru's pretty famous in the world for silver—silver tea services and trays and stuff like that. We shipped a large box of that stuff up.

L: There was no mining, so then you went to work?

Yes. We were living in Oakland at that time, and I went to work two places—Pittsburgh, California, and down on the bay around Emeryville. That's where we were building a dock. We built a large dock out in Pittsburgh for Columbia Steel, which is a branch of U.S. Steel.

F: So, instead of working in mining, you were working on construction?

Yes, I was what they call a field engineer for one of the pile-driving contractors.

F: When did your work for the Bureau of Mines come in?

That happened right after I left Mina Mercury. The Bureau of Mines and the army engineers, both. So we're chronologically in pretty good shape here.

F: So tell me what you did for them?

Actually, the army engineers hired a bunch of civilian mining engineers and geologists. Their job was strictly to evaluate the so-called mineral properties that were on areas that were laid out for bombing and strafing ranges. We were evaluating them and making reports on them, and ultimately someone in the government was supposed to see that they were compensated for the lands that were taken from them. I never did hear how that came out.

F: The people who owned the mining claims?

They were mostly claim owners that located claims out there. In my case, I was in Arizona and New Mexico, and for a short time in Nevada. A big piece of land was withdrawn here in Nevada for a bombing range, and later it was used for testing atomic test work, down by Tonopah and Vegas.

F: Did you happen to run into Vic Kral when you were doing this?

Oh, yes.

F: Did you work together?

Well, we were classmates.

F: Right. You were classmates. And did you work together on this project?

Yes. Oh, yes. We were in the same office in Phoenix. We spread out pretty well when we left.

F: I wanted to go back and just check, because I wasn't sure I got the sequence right. You did the Bureau of Mines and army engineer work first and then went to Alaska?

Yes. I joined H.W. Gould and Company and did some design work in the office, but very little. Then I went almost immediately to Alaska and then later on to Peru. I was only with the Bureau of Mines for a very brief stay, and then I went right with the army engineers, but the work overlapped just a little bit, that's why. But I was only with the bureau, perhaps, maybe as little as four months.

F: And army engineers, about how long with them?

Not too long, maybe six months.

F: So those were both brief. Was that a requirement that you be involved in that, rather than go to the service?

Well, for one thing, my draft board at that time was in Hawthorne, and I never did get a notice from them. The only notice I ever got from the draft board was when I went to work for Gould in San Francisco. I signed up with the draft, which you had to do wherever you were living, and I heard from them almost immediately, just as I was leaving for Alaska, but the company took care of it.

F: Because they needed you? You were in a strategic job?

And working with strategic metals, yes. I didn't make any effort to avoid being drafted, but back in those days the companies worked hard at it.

F: Because they needed you?

Well, they had to, because they, you know . . .

L: That's the only way they could get their people?

Yes.

F: All during this time, that was mercury mines that you were working on?

During that period, yes. In Alaska, too.

L: Now you were married then?

Yes, I was. January 1941, it was. We lived as a married couple in the camp at Mina Mercury.

L: And then you went to Alaska?

Well, we were together during the time we were at the army engineers, and then later I was in Alaska. She didn't go to Alaska, of course, but she did go to Peru. Tommy was born when I was up in Alaska.

She hadn't appreciated me being away from home, apparently, because having a baby's no fun at any time. She was in San Francisco, living near a hospital. On my way home I called from Seattle. She said, "Who is this?"

And I said, "Tom."

"Tom who?" [laughter] She gave me a very bad time.

F: How did you learn that you had a son?

Well, that was interesting, too. The planes came over our construction camp every once in a while, and one of them flew over kind of low and dropped a message. It said, "If you have a fellow named Cahill here, tell him he's got a son, born on such and such day."

F: Was the mail not steady?

It was very unsteady. Very unsteady.

F: Erratic delivery?

Yes. These Alaskan bush pilots are interesting people.

F: You've done quite a bit of travel with your work in mining. What place would you say you enjoyed the most out of all of these?

Well, that would be hard to say.

F: Did you like something about all of them?

Oh, yes. Sure.

F: After Peru, then, you came back, worked for Columbia Steel?

Yes, I worked for a pile-driving contractor.

F: And then how did get back into mining?

That was a little devious. We decided to move up to Eureka, Nevada, because I was familiar from many years back that there was a tremendous, big ore body at Eureka. I thought if I could move up there and get into business, I could be a businessman in a prosperous town, but it didn't work out that way. We did move to Eureka, and then the first mining job I had after that was working in the Eureka mines.

There was a big operation there called Fad Shaft, and this was a Canadian company. They were trying to get down to this ore body that everyone knew was down there. It was discovered by drilling, and it was down a little over two thousand feet to get to the real ore bodies. But the water was a major factor there, and they spent most of their time trying to keep the water out of the shaft.

F: And when you say an ore body, was it gold?

Eureka produced gold, silver, and lead, and some zinc. Lead was their big product, but it's about equally divided between silver, gold, and lead, with lead being a little bit larger, as I recollect.

F: What was your job with that company?

Well, I was tending pumps for the first part of it, down in the shaft.

F: To help pump the water out?

Yes.

F: What kind of pumps were you using?

I can't remember the name of them, but they were typical high-head pumps. That is, they were pumping at a very high head. As I recollect, we had our big pumping stations at twelve and fourteen hundred feet down the shaft. Well, I had two big pumping stations there. One of them twelve-hundred level, and one of them fourteen-hundred level.

F: Were you in charge of both of them?

No, I was just watching the pumps. I didn't have any very important job there.

F: Were you doing shift work then?

No, it had to be all day shift. I didn't really get into mining again until after I left Eureka. Well, let's see. I was out of mining starting the pile-driving job in Pittsburgh, California. I must have started about 1947. As I recollect, we went to Eureka in late 1947. Then the next mining job I got was at Copper Canyon in Battle Mountain, Nevada, which was in 1948.

L: You mentioned you had a business in Eureka. What was your business?

We had a motel and gas station, and I think I mentioned to you that I was a registered land surveyor in Nevada. Also registered as a mining engineer. Business could have been pretty good. I had all the business I could handle. That is the gas station and so forth—surveying.

L: What was the name of the motel and gas station? Do you remember?

No, but it was historically interesting, because it was the main office building for the Richmond Mining Company, which is the second largest mining company in Eureka. And there are big mines there.

F: Was the one that you were working on the only one that was in operation at that time?

Oh, there were a couple of smaller ones. But the Fad Shaft operation, which was called Ventures Limited, a Canadian outfit, was the largest and really important one. I suppose they employed somewhere maybe around 250, 300.

L: Well, for Eureka that's quite a few. Eureka isn't the most populated place in the universe.

F: Was there anything unusual or remarkable about that job, other than the water problems they were experiencing?

Yes. There was really no way for them to get down there unless they got rid of the water, so it was at a standstill when I left. They had stopped trying to pump it. And if you want me to comment briefly about what happened to that mine, it never did get into production. The ore's still down there. And part of what happened was that there's a process known as pre-grouting in which they pump cement right down and fill all these

intricacies in limestone rocks. Some of the limestone caverns there where you fill it up became bunched up with concrete. That would stop the water, but, unfortunately, the way the Eureka ore occurred, they diluted the ore. The ore was in these cavities in the limestone. And they actually, by forcing concrete down there, diluted the ore to the point where it—I'm guessing on this—was simply not commercial anymore. It was cement.

F: I wonder if it would be commercial grade now?

They've never had it reopened. There is a new surface operation in Eureka that's strictly gold. It's very near this mine we're talking about. Homestake owns that mine, and the last I read, which was about a month ago, they're doing very well there. It's an open-pit operation.

F: What's the name of that one?

I don't know, except it's owned by Homestake. They made a couple of attempts to reopen it, but they never did put it in production.

F: After it closed, did you stay in Eureka and operate your business?

No. I went to Battle Mountain. Went to work at the Copper Canyon Mining Company. I was an engineer, and for a time I was assistant manager. I was there for about a year and a half to two years, something like that.

L: And did you live in Battle Mountain or commute?

No, they had a camp out at Copper Canyon, nice camp. Anaconda had operated it previously, and they had built a nice camp.

F: So you lived there with your family at the camp?

That was about the time my family and I separated.

F: I see. So you were living as a single man at the camp.

Yes, right.

F: But the camp accommodated families and single people?

Oh, yes. For the time and place and so forth, it was just as good a mining camp as you would find at a mine that size.

L: So, this mining camp was at Copper Canyon. Did they have bunkhouses?

No, nobody lived in a bunkhouse. The people either lived in Battle Mountain, which is about eighteen miles or so down the way, or they lived at the camp in very suitable houses.

L: Oh, separate houses. You had your own house?

Oh, yes.

L: Did you have to do your own cooking, or did they have restaurants?

I was doing my own cooking, yes. But they had a boardinghouse there.

L: They did have a boardinghouse. Well, actually, you're a good cook, so that's OK. [laughter]

F: Was this a pretty big operation at Copper Canyon?

It was a standard size. I think the payroll there was around three hundred people. I can't remember exactly.

F: And Copper Canyon is a copper mine?

Originally, it was a copper mine, but we were mining a separate ore body which consisted of lead and zinc.

F: Because you were still in that time period where the industrial metals were what was needed, is that correct?

That should be a pretty good guess, I'd say, yes.

L: Who was buying most of your lead and zinc?

We shipped it to a smelter who was selling in the Salt Lake City area, International Smelting and Refining, which was a subsidiary of Anaconda.

L: Was it mostly domestic use, or was it shipped overseas?

Well, you know, lead is used in batteries, for one thing. It's just got a world of uses. Some of it might have been shipped, too, I don't know.

F: So you were there just a couple of years, and then what?

Then I went back to Round Mountain, because they had a very interesting gold operation there. I got back to Round Mountain in 1950.

F: For a gold mine?

Yes. They called it a dredging operation, but actually it was a very large-scale digging

operation. They patterned it after some of the big gravel pits in the Los Angeles area, but it was a very substantial company. One of the big backers of this operation was Consolidated Gold Fields of South Africa. Working through their Mexican subsidiary in Fresno, they put up half, and Yuba Consolidated in California was the other partner. I think we were mining about, maybe, three thousand yards a day.

This was open pit. You're familiar with dredging, aren't you? That's where a boat actually floats on the water, and they dig with a long cup on a line. But this was done with a large shovel and conveyor belt, and the plant was located away from the pit. Anyhow, it was not successful. They shut it down.

F: Was this your first experience at open-pit mining?

Oh, I don't think so, no.

F: Was there anything different about this?

Well, except the size of the shovel. It was a seven-and-a-half-yard shovel.

F: Was that large for that day?

Yes, for that time it was fairly large.

F: And they were trucking it out, or they were conveying it out?

Conveying it out. The shovel was loading into a big bin there, and then a thirty-six-inch conveyor belt was pulling out of the bottom of the bin, taking it down to the plant.

I had a variety of jobs there. I went there first to write a report on the underground possibilities in Round Mountain, so I was up in an office at the old mine about a year, I

guess. Later on, I went down in the office and was never designated as the assistant manager, but I spent all my time with the manager. We used to ride around like we were a couple of brothers. He was a fine gentleman, by the way. He came from Ely. He was a plant superintendent over there for the concentration plant of Kennecott for many years.

F: But you sort of acted informally as an assistant manager then?

Yes, it was informal. I never did have the title. I just did a variety of things there, anything that wasn't related to hard work I did. [laughter] I did some surveying.

L: How many people were there at that mine?

We worked three shifts. I suppose about the same size as Copper Canyon, two hundred fifty or three hundred.

F: Why was it not successful?

This is a technical thing. The ore, as it got down deeper into the gold bearing part of the ore, was clay—a very sticky clay. This gummed up everything in the plant. They couldn't pull it out on a stock pile, and they couldn't handle it at all in the plant. So the plant was the unsuccessful part of it, because they couldn't get the ore through the washing plant, you know.

F: And they never found a solution to that, to keeping it from gumming up the plant?

This particular operation did not, but later on they came in there and handled it differently, and they did make some money. Fresno came back up there and mined it. Morris and Knutsen had a contract to dig it,

and they treated it in a slightly different plant. I wasn't familiar with that.

F: But while you were there they didn't find a solution to the problem?

No. It closed down, and they started it up again, retrieved all the money they had lost, but not a great deal more. As I recollect, this is all thirty-five-dollar gold. I know it was, yes.

F: So, we're still at thirty-five dollar gold in the early 1950s?

Yes. As you know, now Round Mountain is presently one of the largest gold operations in Nevada, but they're mining not just placers. They're mining everything, took the whole hill down. I read just recently that their production the last year was roughly \$153 million, and they've been in production for at least ten years, I guess.

L: I think I heard they said that they've got another twenty years?

Yes, they've got at least twelve.

L: How long was the mine down when it closed down in 1952?

It was a year and a half, two years when they started up again.

F: But you weren't there when it reopened?

I was not, no.

F: Did you have a sense when you were there that the gold was there if they could just solve these problems?

Oh, the gold was there, certainly. I always knew that. In fact, I wrote a report for Fresnillo. That, incidentally, was one of the better jobs I've had. I was assistant project

manager for sinking two shafts in Ely for Kennecott. The contractor was in New York. I was working for the contractor. That was a very interesting job. I used to think that the Eureka shaft was a wet one, but they had two of the wettest shafts that have ever been known in Nevada at Ely, and I was sinking two shafts. We used what we call intrusive pre-grouting. I mentioned that it was a British company that did the grouting. What it amounted to, briefly, was you would pour a concrete plug in the bottom of the shaft and then put the pumps on top of that and drill out radial holes that went seventy, seventy-five feet deep. And that would put a grout curtain around the areas you wanted to sink in. Then you would proceed to sink the shaft down for sixty feet through the grout curtain, and then put all the pumps in again, and drill out these grout holes and fill them with concrete.

F: So you're kind of putting a plug in and always keeping the water below where you're working?

You're really sinking a shaft right through a concrete plug, is what it amounts to.

F: I see. Was that new technology at that point?

I don't think it was new, but it was apparently pretty new for Nevada. The British, I know, had used it for years in South Africa, and I'm sure we used it elsewhere in this country. I would suspect back in the Missouri lead belt they did that, but I wouldn't be sure about that. That was the first time I had seen it in operation.

F: And especially here in Nevada.

Yes. I didn't stay to see the bottom of the shaft. I can remember one time we were set up and pumping the concrete. And normally, you would do what you called "pump to re-

fusal.” That means that no more cement could go through this particular drill hole. But then we had one hole there that we put in, as I recollect, something like 100,000 bags of cement, and it finally pumped to refusal. I often suspected we were filling an open cavity up somewhere in there again. It was a carboniferous limestone type formation. It would have caves in it. That one got expensive, but generally it would form a curtain pretty fast, and we would pull out those dry pumps and put the miners back down in there, and then sink the shaft—roughly about 50 feet—and then we would commence the grouting. That’s about the size of it.

F: So you put the miners back in there to sink the shaft. Were they also pulling out the ore at the same time?

No, we weren’t mining any ore at that time. We were getting all our ore at that time from the pit. They had developed this ore body. They knew they had this big ore body up directly from the surface down. We were sinking two new shafts. The name of one of the shafts was the Deep Ruth, and the other was Kellinski. The Deep Ruth would’ve been the production shaft, and the Kellinski the manway and pumping shaft.

F: So, eventually they did some mining in there?

Oh, they did an awful lot, I heard afterwards. I left there before the job was completed. I had a better offer in Gabbs, Nevada. But they did concrete all the tunnels that they put out to get under the ore body. They put in the necessary stuff so they could use the branch raise caving system. But I don’t know whether they actually mined the whole body or not.

L: Did we ever say what they were mining there in Ely?

This was copper and any gold, silver content that they could recover during the smelting process.

F: You met Loretta’s mother in Round Mountain, but you got married while you were on the Ely job?

Correct. Yes.

L: I was fifteen.

F: And you moved from Round Mountain to Ely, is that right?

No, just the two of us went there. I don’t think there’s anything that I can comment further on that. The name of the New York contractors, incidentally, is Foley Brothers, from the state of New York. They’re a well-known company that specialized, I think, in mining shafts.

F: And then you said you got a job offer at Gabbs. Tell me about that job.

This almost comes to the end of our interview here. That job lasted for twenty-seven years. [laughter] I went through a series of jobs there, and I ended up a manager down there. I started as assistant mine superintendent.

F: And this was mining what?

This was magnesite, a non-metallic thing. I might want to pontificate a little bit on that. In metal mining, generally speaking, you’re mining so you can produce below the price of the metal. In order to make a profit you have to keep your costs below what the metal sells for. And non-metallic mining, I found out, is very competitive. It’s not working toward a price at all. You’re trying to beat the competition, and there’s a lot of good competition in the magnesite industry.

F: Trying to beat them in terms of amount of production or pricing, economics?

No, in net profit. Gabbs, incidentally, is one of the largest deposits of natural magnesite that there is in this country. There's some in China. Matter of fact, the same company, I think, has been mining in China.

F: Tell me the company name and the name of the mine that you were working for.

Oh, it was Basic Refractories, and our main office is in Cleveland.

F: And the name of the mine?

This was the Gabbs, Nevada, Mining Operation, mining department. While I was at Basic, there in the department those twenty-seven years, we started an exploration program, and we set up a little office over in Round Mountain in a trailer. I wrote a report in which I highly recommended Round Mountain as a good investment, but the company was just not big enough to handle something like that. To start an operation nowadays costs a lot of millions of dollars, and they didn't feel like going into another partnership. I wrote what I considered to be a really fine report on it, because I do know more about Round Mountain, or did at that time, than almost anyone. Did we get into that A. O. Smith operation at Round Mountain?

F: Not in any detail, so why don't you go ahead and describe that?

Yes, well A. O. Smith is a Milwaukee company. At one time, I understand, they made about 75 percent of the auto bodies in the country. Then later, they got into the glass-lined steel vessels like they use in the wine industry and the beer industry and other related industries, like hot water tanks, et

cetera. It is a very successful company in Milwaukee. They were investing in a pretty healthy exploration program, looking for a big gold mine. And they had some very high-class people in the R.M. organization—geologists, mining geologists. And we were looking at every state in the West here, and later in Salvador. But they were a real fine company to work for.

L: When you were working with them in Round Mountain, this was what year?

A. O. Smith moved into Round Mountain in early 1936, and they had almost a million-dollar investment there. They built a large assay office, and they had what they call a sample mill. They dug an awful lot of trenches over the surface of the hills there. And they would put that tonnage through the sample mill. In addition to that, we were cutting samples. Round Mountain had about six, or maybe even seven, miles of underground workings, and we sampled everything by hand sampling. They were just huge, big samples. The normal assay office runs a sample, referred to as an assay ton, but at Round Mountain we used extra large crucibles and five-assay-ton charges. That is useful when you're handling low-grade materials. You get a better idea of the value. Bigger furnaces and everything else.

F: Working with A. O. Smith, you really were familiar with Round Mountain and the resources there?

Yes. I was the head guy up in the engineering office, where they had about twenty people. We had a lady that we imported from Salt Lake City that did the drafting. She was an excellent draftsman. And we just had a good crew there. Everybody was busy.

F: So then, when you went to work at Gabbs, you already had a background.

Yes. I wrote at least three reports. They were all non-published. They would have been in the files of the old company back there.

F: But they just didn't have the money to invest?

Investing in something that might prove profitable, and at the same time use money that would normally go to taxes. I accidentally discovered a new gold mine in Nevada. We were sampling an old silver mine up at a place called Northumberland in Nye County. It was our habit to cut samples everywhere there was an opening in the ground. And this one place had the start of an old tunnel that was in back of the cook shack and boardinghouse. We cleaned it out and cut samples in there. By an odd coincidence, Northumberland was always known as a silver mine, but all those samples ran over an ounce in gold. And it was pure accident. That happened to me running the crew out there. This was 1936.

F: So, did that turn into a gold mine?

It did. The fellow's name was Jim Perkins. They moved their operation from Weepah—took the mill and everything—out to Northumberland. There they produced right up until 1942. I don't know when they put the plant there, maybe 1939 or something like that. So they produced very well out there.

Jim Perkins was running the operation. I might say a word here about Jim. He first came to this country from Jerome, Arizona, where they had a very large operation, and he was an open-pit foreman there. They had previously been an underground operation, and they had enough stuff there that they turned it into an open pit. Jim was a very able engineer, and then he had family here. One son works for the Nevada office of engi-

neers here. I can't think of the proper name for it.



F: We want to go back and pick up a few things that we've missed along the way. One is that you were involved in a national honorary scholastic group while at the university. Would you explain that to me?

Well, it's exactly what you said. It's a national honorary mining fraternity. That is, you're selected. They select certain members of high scholastic standing in the junior class in the fields of mining, metallurgy, and petroleum and ceramics. I don't remember anyone ever taking any petroleum or ceramics. They were mining and metallurgy, primarily. The name of it was Sigma Gamma Epsilon.

F: When you say "high scholastic standing," what were the guidelines for that?

Well, I think that the professors gave them out to the committee, whoever did the electing. I don't know who it was.

F: So you didn't know exactly what grade point you had to have?

No.

F: And were there some others in Sigma Gamma Epsilon that you worked with over the years?

Yes. There were a couple of them in here, namely Pat Willard, who spent many years as manager out at the Basic operation in Gabbs, Nevada.

F: Did you work for him when you were at Gabbs?

I started out working for him, and I worked for another gentleman, Bob Gates. In my later years up there I was general manager myself of the operation.

L: How many did they select from each class? Do you have any idea?

You started at the junior class. It was just selected from the junior class only, and they'd choose, roughly, about eight out of a class of thirty.

F: So that was quite an honor?

In a way, yes.

F: In a way?

L: In a way. [laughter] It was an honor, period.

F: [laughter] You mentioned a mining system that I don't have documented for this project yet, and you called it the "branch raise caving system." Could you go into some detail and describe that to me?

Yes. This is a very old and well-known mining system. Briefly, it consists of putting up raises from your main haulage level and putting a blasting chamber above the raises. You open it up, and after you get under way, you blast out quite a bit of it. Then, after you get under way, it caves itself. You can see the ground subside. When you go up on the surface you can see the ground subsid-ing. It comes down through any number of chutes, and they draw it out on a mathematical pattern so that they don't make a great big conical hole in one part of the surface. But it comes down as a very smooth, almost level, surface. But you control this by pulling out pre-numbered chutes. That's controlled by the engineering department.

F: Different branches?

Yes. And you have a blasting chamber just above the haulage level, where you break up the larger things, so that they can come down and not hang up and, there again, form any cones in the subsid-ing material above.

F: And I'm not understanding when you say, "hauling level?"

Haulage. In most of the newer mines these are concrete tunnels.

F: Where they run the equipment and haul the material, the ore, out?

Right.

F: OK, I see. And this was something that you saw being used in Ely?

It was previously used in Ely. As a matter of fact, I think that a former manager by the name of Larsh is the one who introduced it. I can't say that he introduced it to the mining industry, but he certainly introduced it in the Ely area.

F: And this was when you were working for Kennecott?

Yes, but this Mr. Larsh was there about 1912, 1915, along in there. He was manager there.

F: Quite a bit earlier. And he was the one that introduced it.

It's a very old mining system.

F: I see. So it was not anything new. Was this the first time you had been around this system?

Oh, no. It's very widely used. It's especially amenable to deposits where they have ground that can be self-caving. You know, a lot of ground wouldn't stand to be self-caved.

Ely was fortunate in that respect. And a great many of the big copper mines were mined that way.

F: Is that an economical system, too?

Yes. You don't have to blast—except where you are feeding it into the chute. They have what they call blasting chambers. And this stuff comes down out of the raise and rolls out over a bunch of steel rails that are set in concrete most of the time. And you blast right on top of those rails, to reduce the big rocks that come down. Reduce them in size.

F: I see. You mentioned before that you accidentally discovered a new gold mine at Northumberland.

Yes. When I said “accidentally,” Northumberland was previously known as a silver district, and no gold was known to be there. It was our mode of operation, if we saw an opening anywhere around, we would go in there and cut samples. The way we found that was that out in back of the cook shack there was a little tunnel where they kept the food cool. We went in there and cleaned out the food and everything and cut samples. And two or three of those samples ran over an ounce in gold. That's the first time gold was ever heard of in Northumberland, and it was quite a ways from the mines—possibly a mile or two from the mines. I was working for A. O. Smith Corporation, and we were sampling everywhere.

It sat dormant for quite awhile. This was in 1936 when we discovered it, and it was dormant for a good many years. Then a fellow by the name of Jim Perkins came. He became quite prominent in Nevada mining at Weepah. That was an old wildcat boomtown. But anyhow, he was the one that was in charge of the operation at

Northumberland. He put up a good-size mill. I can't remember the tonnage capacity, but it was pretty large. They mined until they were shut down by the government. They started about 1939, I think, and only operated until 1942, because the government shut down all non-essential, non-strategic mining, if you recall that.

F: For the war?

Yes. So they didn't want to mine any monetary metals or anything that could not support the war effort. I think what they called strategic metals were copper, iron, and lead, zinc.

F: So, when you discovered this and you were working for A. O. Smith, was that already on his claim?

It was on mining claims, none of them are patented. They were just held by one old prospector up there.

F: Oh, I see. Did A. O. Smith buy that claim?

We did not. I thought we should get involved in it ourselves, but I don't think that A. O. Smith was actually trying to find a mine that they could operate. I'm only guessing this, but I think that they were spending money that would normally go for income tax. If they had come across something really big, of course, they probably would have tried to operate it.

F: And did that turn out to be a real productive mine?

It was not better than, but equal to, a lot of the average mining camps. I would say that production was considerably less than Round Mountain or Manhattan or Tonopah, but it was a respectable amount.

F: So, you located that mine, but would your name be on any claims?

No. I didn't locate it; it was already located. Fellow by the name of Dave Neal owned all the claims.

F: OK. He owned them all, and you were just sampling?

Well, when you say "owned them," you don't get a title to a mining claim unless you go through a patent process, but you hold them by virtue of doing a certain amount of work on them each year. This thing is being discussed pretty heavily back in Washington right now. They want to get more money, one way or another, in addition to giving a better title to the properties.

F: So, that's why you say these were not patented, but Dave Neal owned them by doing work on them.

Owned them by virtue of having located them and doing a certain amount of yearly what they call "assessment work."

L: Was Dave Neal aware that there was gold on it?

Nobody was aware of it until we brought these samples into Round Mountain and put them through the assay office. And the only reason that I take partial credit for it is I was running a sampling crew up there. I told them where to cut the samples, having no idea at all it would be gold.

F: But the fact that you did it at this tunnel, where they kept the food and everything, meant you were doing it everywhere you went?

Yes. That was our policy, to sample everything that was available to be sampled, that is an excavation in the earth.

F: I think from there, then, we're probably ready to start talking about your time at Gabbs. Remind me again what year you went there.

Well, I went to Gabbs from Ely, from that shaft-sinking job. I left before it was completed, mainly because of the winter weather. I left there in December of 1952.

F: Was it a bad winter?

Not for Ely, I guess.

F: Bad enough that it was tough to work there?

Yes. Well, there was a certain amount of commuting to do to get to the job. Anyhow, I would say, perhaps, I was guided by the bum weather more than anything when I resigned there. I did resign.

F: Well, did you already have this offer to go to Gabbs?

I did not. In fact, my wife asked me, "What will we do now?"

And I said, "Well, let's borrow some money and take a vacation." [laughter]

Anyhow, I did start making phone calls, and I called my friend Pat Willard in Gabbs, and he says, "Yes, come on over."

But we did take a short vacation. And I would like to point out here now, that's the only nonmetallic mine that I ever worked in. I did spend twenty-seven years there. But the essential difference between metallic mining and nonmetallic is that in the metal field you have a price for the metal. And you know exactly what you have to do—you have to mine and process below that price to make a profit. In the nonmetallic field you don't have any set prices, but it's a highly competitive industry. A lot of the non-metallics are highly competitive, and magnesium is a notable one. But you have competition on a

world-wide basis. A lot of companies go to foreign countries where they don't have to pay so much in the form of wages and so forth. And then, the item of competition is always in front of you in this type of endeavor. Also, this happened to be a deposit in nature; it was in dolomitic host rock. That's dolomite. And we had the only one of any size in the United States. But the competition in the United States itself came from seawater plants. Magnesite is very readily recovered from seawater, and eventually we got into the ownership of a seawater plant down in Florida, but not right away.

This is magnesite. The ore is magnesite. And magnesite is magnesium carbonate, but, in practically all forms of use, it's converted to magnesium oxide. When I first started with Basic, the main use for it was in high-temperature firebricks, principally, in the steel and copper industries and lead. But there became a wider variety of uses over the years, and, like I've mentioned, notably the wood-pulping industry used it very widely, and it was used in insulation materials. We used to ship any number of products out of Gabbs, generally in bags but sometimes in bulk, to different industries. It's even used in the chemical industry, and in the medical industry as milk of magnesia. And we did furnish some to the Phillips Milk of Magnesite Company. But that's a very high grade, a pure product. You have to go through a lot of processing to get that pure.

F: And all the processing for each of these products was done right there?

Right at Gabbs. Yes.

F: Tell me a little bit about what job you started out in.

The job I got was assistant mine superintendent, but there really wasn't anything to do in that job, so I almost immediately started on exploration work for Basic. We

worked around Nevada trying to find a gold mine, of course, but we got involved in exploration in Mexico for gold and silver. I made about, at least, eight trips to Mexico. And then we got word of a magnesite property in Guatemala. I made four trips down there, but we finally gave up on that. That was back in eastern Guatemala, very dense jungle country. I was surprised. I had previously worked for a short time in the upper Amazon, and I'll say that the jungle coverage in eastern Guatemala was just as heavy. Rain forest is what it was.

F: Quite a bit different, going from the desert of Nevada to rain forest.

Yes. That's the only place in which I am aware that they do have a heavy rain forest in Central America. There could be others that I don't know about. Guatemala, as you know, adjoins more of Mexico. That's where the old Mayan ruins are, and we were very close to some of the old Mayan ruins in Guatemala.

F: Were you able to go see them during your visit there?

No, we didn't.

L: You know, it might be interesting, Tom, to tell them about how you got into these places.

This was quite a trip getting in there. We would drive across from Guatemala City to eastern Guatemala, a place called Lake Izabal. This was right near the Atlantic side of the country adjoining British Honduras and the Atlantic Ocean there. We would drive across the country in a jeep and then stay over night at the lake, sometimes two or three nights, waiting for the lake to quit having big waves from the wind blowing. Then we would get in a very large canoe and go across the lake—it was several miles—

and get on the far shore of the lake. Then we would transfer to a smaller canoe that's powered by a small gasoline engine and go about thirteen miles up this river, and we would park the canoe and walk in the rest of the way with a crew cutting the vines and stuff out of the way. They had a nice camp set out there, you know, a livable camp. It consisted of huts that were sitting up on levees off the ground, so they were fairly dry.

F: And that was all set up when you got there, the camp?

Yes, it was. You couldn't believe you walked through that much jungle to come into a pretty habitable camp. It's quite a surprise.

L: Can you describe the camp a little bit?

This engineer that took me in there was graduated at the Colorado School of Mines, and he had been in that country quite a long time. Anyhow, he and I slept in hammocks in a place that had a roof on it, but that was all.

L: What year do you think this was?

I started working in Gabbs in 1953, and I didn't get down to Guatemala until 1961. First trip was 1961. That went on for maybe three years—1961, 1962, at least.

F: And so you were there with a mining engineer or geologist?

Yes. He was a graduate of Colorado School of Mines. We were mapping the geology, but as it turned out, it was not the type of deposit that we could use. There's two types of magnesite deposits. One is in sedimentary rocks, like dolomite and limestone, like we had at Gabbs, and this one down here was in ultra basic rocks, such as diorites and

so forth. The stuff is much harder to separate from the country rock than what we had at Gabbs, and it did not make nearly as pure magnesium oxide as what we mainly get, so we gave it up. Anyhow, the exploration continued.

L: Besides the going in across the lake, how about the time you had to fly from a base place to a mine?

Boy, that was rather interesting. That was in the state of Durango, central Durango, Mexico. Durango at one time was the headquarters for Pancho Villa, the old Mexican bandit. They still remember him, still talk about him down there. Anyhow, we flew in on a small plane. I had my wife with me on this trip. Flew in on a small passenger plane, single prop. This mine had a so-called airstrip up there, and it was like flying in and landing on the keys of a pipe organ. It's a very short strip, and the mountains move right up behind it. Picture a pipe organ there. The pilot didn't have a chance to circle it or anything. He had never been there before. He came right in, direct. The interesting part was, there was a lot of livestock right out on the airstrip there, and when you commit yourself to a landing, you have to go in and land, because you can't climb back up. The little plane couldn't climb steep enough to get up out of there. So, there was a lot of scattering of livestock and chickens and so forth when they got it on the ground. He didn't speak very much English, but he says, "Very, very close. Very bad." [laughter] So, everybody that got out of the plane had to go to the bathroom right away. I can remember that.

There was four of us on the plane. He had an interpreter there and then my wife and I and the pilot. Quite a trip.

This was an exploration trip, and I stayed at the mine. And the pilot returned to . . . I can't remember the name of the town where

we left—been there a lot of times—but my wife went back to the hotel with the pilot. I stayed in there for three nights, examined the mine during the day. Flying out was pretty interesting, too, because the airstrip would terminate immediately, right against what looked like a vertical cliff. And it was, they told me, about a 2,000-foot drop down to the bottom of that cliff. And you didn't get a very long run at it, that's for certain. I thought it was pretty hairy.

L: What were you looking for there?

Silver and gold in Durango. I met the old gentleman who was promoting this to the company, to Basic, and he came in on a truck from the other side of the mountain there. That's a sensible way to come, too. He met me there, and we looked around for a couple of days.

L: And what did you determine when you were at that mine? It wasn't any good, or it wasn't economically feasible?

No. None of them were economically feasible. If they had been, someone else would have been working them.

F: At what point did you change from exploration to staying in Gabbs more?

As I recollect, around 1968, somewhere around there. The fellow who had been mine superintendent retired, and I took over as mine superintendent. Then I stayed around in Gabbs most of the time, but I must have had a good ten years of exploration.

L: Now, did the exploration take you just to south of the border, or did you do exploration anywhere else?

We didn't do very much, except in Nevada and Latin America.

F: But quite a bit of travel during that time?

A lot of travel, yes.

F: A lot of time away. Were you in Gabbs, Loretta?

L: Yes, at that point in time. I was there from 1953 to 1954, and then we moved back again in 1955. That's when I was married. And we were there until 1958.

F: So you were there as an adult, a young adult?

L: Very young adult.

F: I see. So you weren't living at home?

L: No, I was married, and my husband worked at the mine as a truck driver.

F: I'm curious about what it was like to be superintendent of that mine.

This is an open-pit mine; there was no underground working at all there. Well, there had been some underground work several years before Basic took it over. I think at this point I should probably explain that Gabbs was originally started as a mining operation about 1940, about the time the war in Europe was starting. And that was such a large deposit there, a magnificent deposit of ore. That was the reason that the town of Henderson, Nevada, was built. This was to bring the magnesium oxide product down to Henderson and convert it there into metallic magnesium. It might be well to mention here that metallic magnesium was used very largely in firebombing. It's the metal itself; it hardly ever exists, unless it's treated, but magnesium metal, when it is exposed to the air, bursts into flame. They used it in firebombs all over Europe there, wherever we were bombing.

F: So, it was one of those strategic materials?

Very much so, yes, at that time. Finally got a lot better uses for it. They made an alloy of magnesium and aluminum, and a great many of our airplanes were built of this alloy material, because it was light, and the alloy of aluminum and magnesium was much stronger than ordinary aluminum. Made a fine airplane and is structurally very sound.

L: What was the size of the mine, say, in the war years?

Well, as I say, it was open pit. There was a number of pits there. Most of it was under the ownership of the original Basic company, called Basic Magnesium. They were based in Cleveland, Ohio. And other parts of the ore deposit there were owned by a company also from Ohio called Standard Slag Company. Ultimately, we mined the entire deposit. We had leased the Standard Slag claims, but at the termination of the lease they went back to Standard Slag and are, as I understand, under the ownership of Standard Slag right today. But we were the largest operator there all the time.

To give you some idea of the size of the operation, they would vary from about 250 to something a little over 300 people. Mined by standard open-pit methods. We did have a very highly selective way of telling the ore from the waste. All the drill holes are plotted on maps, and from the maps we made what we call a chemical contour. That's used pretty widely in today's gold mining here in Nevada. They don't call it a chemical contour; they call it just a contour map, I think. But the thing is based on an assay value of the drill hole itself. In our case it made a pretty complicated map. Each chemical grade of magnesite had a different color on the map.

We blasted in ten-foot benches. After we would blast, then the engineers would go out and stake out the areas that we wanted to haul down to the crusher. And they still do this. This is the way they do it in the Nevada gold mines, too. The people on the shovel through the mine foreman know exactly where to dig, and they have people there to tell the truck to go to the waste dump or go to the mine or go to the crusher.

Our friend, Conrad Martin, was the one that drew up these chemical contour sheets originally and taught the engineers how to make them. I wanted to mention him. He is a very fine geologist. He worked for many years for the United States Geological Survey. He's living in Reno now and a very good friend of mine.

This was a scientific mining venture, and it had to be closely controlled. As I pointed out to begin with, you were in a very competitive situation there, and you had to be good at what you did. But we did have some good guidance to begin with from Mr. Martin. The chemical contour map in itself is not anything new, but he had a pretty refined system there that we were able to use.

F: So you knew exactly where you could get what grade and so on?

Yes, that's right.

F: Is that the kind of thing that would keep your costs down then?

That's correct. You don't have to move the stuff two or three times. You get it at the right place the first time. And I might add that we had five different chemical grades of magnesite that we would go from the pit to the crusher on, in trucks. The material was hauled in trucks, and it went through the crushing plant, and we knew in advance what was going through the crusher. It went

out over a series of conveyor belts and would end up in one of these stockpiles. One of them was a very high-grade material, and they went from chemical grades on down. We were able to ultimately come up with a very good grade of material from any of those piles, because we had two methods of beneficiation there. Beneficiation means upgrading the ore to, chemically, a better product.

We had a flotation plant for one thing, and the other plant was a heavy media separation plant. These are both well-known metallurgical methods for upgrading ores. So at all times we knew pretty much what we were doing, or trying to do, to make the products.

This might be a time to briefly describe the plant. We had, counting the standard slag rotary furnace, three large rotary furnaces. One of them was around four hundred feet long. And we had, I believe, four hearth furnaces. Hearth furnaces are vertical furnaces. You feed the ore at the top, and it works down towards the bottom of the system and breaks, and the ore is burned at various temperatures in these hearth furnaces. We had what you call Herreshoff furnaces. These stand vertical. Incidentally, we used both of these types of furnaces in the mercury industry, when I was working with that.

F: So, you were familiar with this type of furnace?

Yes, but they were standard machines in any beneficiation plant. And then depending on what kind of product we were trying to make, they would go through the Herreshoff or the rotary furnaces. Then we had a great many big concrete storage slabs. Those were where various products were stored.

F: So basically, it went through the crusher, across conveyor belts, and then

into the stockpiles? And then from there either to a flotation plant or the heavy media separation plant?

Right.

F: And in those plants, that's where the furnaces were?

No. The furnaces were in the furnace sections of the plant. The furnaces were not in the heavy media or the flotation plant. They were in an adjunctive building.

F: So, we stopped just for a minute to look at a picture so that I could understand what these rotary furnaces looked like. They're big, long tubes outside of the buildings, and the material moves through those and is heated, is that correct?

Yes. The fire is at one end, and the material is fed in from the upper end and goes slowly through the furnace and discharges at the lower end. I want to comment at this time that the temperature used in burning the magnesite in a rotary furnace is one of the highest temperatures that is used in any industry. It's up around 3,300 degrees Fahrenheit. You've heard me mention a little while ago that in the early part of our operation there these bricks were used in the steel industry, so they had to be made at a high temperature. And there were certain additives that went in with the magnesite. One of them was chromite, chrome with silica, and two or three other types of chemicals that went with them.

Another thing that I wanted to comment on was, in later years there, we had to put in dust collectors. This is about the time that the EPA became a force in our lives, and we did spend a good many million dollars on dust collectors. We had two types—bag houses and electrostatic dust precipitators. In the bag house, the material that we col-

lected as dust could be used later in product, but unfortunately, we got no use at all out of the precipitated product—it was just pure waste. And looking at it from the dollar standpoint, the bag houses were money makers for us, almost, although they cost well over a million dollars. But the electrostatics didn't give us anything, as I recollect, that was worthwhile collecting or that could be used in product.

F: This would have been the early days of environmental control?

We were a pretty dusty operation there in the early days. It was pretty bad. But it finally got to the point where you had to look pretty hard to see a speck of dust. You don't remember that, of course, Loretta. But the dust precipitators worked real good.

L: I remember the dust. When I was there it was really dusty.

It was a real dusty operation.

F: Was there any danger from breathing that dust?

No. I think I commented here that we added silica, but the silica we mined, oh, maybe fifteen miles away from the plant. But it was a non-crystalline type of silica. We found out through many studies done by the Bureau of Mines and others that the non-crystalline silica does not give a person this horrible disease called silicosis. It has to be the crystalline variety. We had two or three lawsuits on this particular subject, so I was kind of an authority on that one, because I was at all the lawsuits. The company was sued by people who said they got silicosis there, but they did not.

F: And did those lawsuits happen while you were mine superintendent?

No, they happened while I was manager. I was present at all of them. There were three, as I recollect, but these gentlemen had the disease before they got there. And as a result of that, we did institute the pre-hiring physical examinations. Everybody should do that anyhow, as a matter of course.

The other plant that I wanted to mention is called a special refractories plant. It didn't show up in that picture I showed you, but here we had a crew that was blending certain things that we couldn't blend easily in the furnaces. We blended them in a special refractory plant. We had a grinding section there and bagged the stuff right there, then we shipped direct from that plant to various places.

F: That was a lot to oversee for a manager.

Yes. Well, we spent quite a bit of time on the telephone with the Cleveland office, because there has to be a lot of budgeting and so forth for this type of an operation. And budgeting was watched pretty closely by people from the Cleveland office, who were really smart fellows. They were good at it, too.

There's another thing we haven't mentioned here. There's a lot of close chemical control in all parts of the plant, and we had a regular chemistry building. We had, I think, up to a dozen people working in the chemical department. But they ran, I don't know, any number of determinations a day, starting from the crude ore in the pit to finished products. There again, it indicates that almost everything you do is with one eye on the competition and one eye on the bottom line.

L: How difficult was it to get a labor force out there, with the isolation of Gabbs?

When the people came there they tended to stay, didn't they? A lot of families stayed

right there. They had nice housing. It was certainly better than your average mining camp. It was put up by the government when the plant was first started.

F: But it wasn't a company town? It wasn't company housing?

It was company. There were, as I mentioned before, two companies operating there—Basic Incorporated and Standard Slag. And houses were allocated according to the size of the payroll at the mines mentioned there. The housing wasn't elaborate by any means, but it was better than adequate for an out-of-the-way mining place in Nevada. You couldn't call it a mine really, because it was a lot more processing than there was mining there.

F: But evidently Gabbs was a good place to live? People liked it?

It was very good. We had a nice social life there, I thought.

L: Yes. What was the recreation?

We had a couple of tennis courts, and I think we had an Olympic-sized swimming pool there. One of my engineering friends and I designed the pool. We had some Olympic specifications as guidelines. But the companies built it.

Someone asked me if we had any recreation up there. I think the most notable one was what we called "Gabbs Day," and this was pretty widely promoted in central Nevada. We had quite a few people come from Reno. But the original poster work was done by a Reno ad firm. It was Thomas Wilson; he was a very well-known PR man. He did a great job. But we used to put out these orange and black posters. They were about three feet long and about two feet wide, and they would catch the eye, if nothing else,

with that orange color. But I can remember one little part down in the corner there, something about a dance contest, and it says, "Fifty beautiful girls," and then down in parentheses in smaller print it says, "Some over fifty." [laughter] This was Tom Wilson's idea. He was very good at advertising.

The principle function there was a drilling contest. They still have them across Nevada here. We drew all the big drillers, and they'd get pretty good prizes. Of course, we had barbecued beef, two big pits there, and the meals were served on the tennis courts. Everybody had a good time at them. Then they had free beer. That's the only place I ever saw they had that.

F: So, did the companies put this on, the Gabbs Day?

Just Basic.

F: Basic did this? So, did you have a group that worked on this?

Yes, we got our own barbecuers up from the Mina area, for the barbecue pits. And it was quite a deal there, but unfortunately, it had to terminate while I was manager. We started to draw a pretty troublesome crowd. I won't mention any names or places where they come from, but they were a trouble-making element. And it was a pretty tough decision. I took a lot of heat on it, too, for terminating it, but we did do it for that reason.

F: Just got too out of control?

Yes, we never had any—hardly any—law enforcement people there. We just didn't need them. But the last one we had was a little bit out of hand.

F: Did you have a riot?

No, no, nothing like that. But they would come in their camping outfits and stay for a day or two, and there was just too much noise.

F: Could you explain to me who is in this picture of Gabbs Day?

In the center of the picture is Governor O'Callaghan. On the left-hand side of the picture is Thomas Cahill here, and on the right-hand side is the president of Basic Incorporated in Cleveland.

F: And this was taken during Gabbs Day?

During Gabbs Day, yes. Basic, the company itself—I might be mistaken here, but I don't think so—financed the entire thing. I don't think that Standard Slag was in on the planning or the financing. If I'm saying the wrong thing, I hope people forgive me, but this is my recollection.

F: So it was really a town party put on by the company.

That's right, yes. There was no cost for anyone.

F: The barbecue was free?

That was always a very long line there by the beer kegs. As a matter of fact, some of our good friends from nearby would come there and get in the line, and they would just make a circle there. They wouldn't go anywhere else all day, except for the free beer, free food. [laughter]

F: Did they have street dances, too?

L: We danced on the tennis courts. It was too hot to be in the recreation hall, so we danced on the tennis courts.

At night?

L: Yes.

I don't remember that.

F: You might have been worn out from putting this project on by the time the dancing started.

Yes. We had some awfully good drillers there. One of them that I can think of is a fellow I have known for many years. His name is Louie Gibellini. He had a bar over in Eureka, Nevada. He was over eighty years old, and he could swing that hammer just like a twenty-year-old. His daughter would turn the steel for him—well, on the double jack. On the single jack he would have to turn his own steel.

L: Were they having the drilling contest in Tonopah at this time, or was Gabbs the first place?

Well, I think that came after we shut the Gabbs thing down. Tonopah has had it every year for quite a long time now.

L: But then didn't it start becoming almost like a state championship?

Yes. And they have a good representation from the Mackay School of Mines, and some of those boys have done very well. In fact, they have a practice yard right there at the university. They get pretty good at it. Well, the drilling contest goes way back to 1906. I have newspaper articles from the old *Round Mountain Nugget* that described the drilling contests on the Fourth of July.

F: That's way back. Did they also do mucking contests?

They also had mucking contests, right. And that's a lot of work. This was held in September, so it wasn't too awfully hot.

L: It was hot.

F: You still remember it as hot? I imagine Gabbs could get pretty hot.

L: I think it's real important that you describe for them another area of recreation that came out to Gabbs and this mining community—golfing, which people tend to think of as “rolling in the dough.”

Well, there's only a very few people that were, comparatively speaking, interested in that.

F: Well, tell them about your course, because it's still used today.

Oh, yes. Well, the course was laid out in a dry lake bed. They had sagebrush and everything, and then most of it was dry lake material. And you would tee up for every shot, but it was a lot of fun.

L: What were the greens on this golf course?

We used oiled sand. We would get the company to furnish the sand for us, the oiled sand, and then we just turned that into a green there. Then we had some flat rakes, and you just rake every time you get on a green. Then we had a raked path there, and you could pick the ball up and move it the same distance from the cup and putt that.

L: What did they name it?

Conrad Martin suggested the name “Sandy Bottom Golf Course.” [laughter]

F: Who designed this?

Oh, a fellow named Dave Wooster was one of the leading ones, and Bunny Barredo was another. One interesting aspect of that, after we built the golf course, they ran a gas pipeline. I previously mentioned that we used coal for fuel, a powdered coal to burn in the kilns. It was always gas, of course, in the Herreshoff furnaces. In the rotaries we used powdered coal, and then later on, oil, and then at the last we began to use gas. The gas was piped in under a very high pressure, 750 pounds pressure. This was used to burn the material in the rotary kilns. But the interesting aspect about it—I was talking about the golf course—it was surveyed to go right directly through our golf course. So we went to all the powers that be. In fact, we even contacted the governor's office. And anyhow, it shows a pipeline, which is supposed to come on a straight line across the valley, but it came down and detoured around the golf course. [laughter] So, we had some political clout there.

L: Let's see, we talked a little bit about housing.

Oh. Medical facilities, you mentioned. This was put in there at the time the government built the plant, an infirmary-type place. It was a pretty good-size building, and we moved it from its original location up at the mine. We moved it down to the town site. And we always had a doctor there, starting about 1955. The doctor would come in, and we would pay them a subsistence sort of a thing. Well, I don't know what the word is I'm searching for, but we guaranteed them a certain amount, right out of the company office there. Then they would practice and charge a regular fee, conduct a regular medical practice there. And they were all good doctors.

First one came from Washington D.C., from the Johns Hopkins University. I believe that's in Maryland, isn't it? Anyhow, his

name was William Welsh. He stayed there for a number of years and then moved to Bishop, finally. Then we had, I guess, about three other doctors after Dr. Welsh. They were all very good M.D.'s. They knew their business. Well, they couldn't take care of any serious injuries, but, fortunately, we didn't have anything too serious that they couldn't take care of. Broken limbs, of course, we generally had to take them to Fallon.

L: And how about delivering babies, that sort of thing?

Well, a lot of those babies were delivered in Hawthorne and Fallon both. I can't remember. Well, a couple of the babies were born en route to either Fallon or Hawthorne. I can't remember now. I believe they were in there. It's eighty miles to Fallon and fifty miles to Hawthorne.

F: And, generally speaking, accidents are always an issue at any kind of mine. Did you have problems with accidents?

We had a very low accident rate. It was a specialty of the planners there. I can remember we had two or three fatalities. I'll just mention two of them. One of them, we had a contractor in there doing some contract work at the brucite pit. I forgot to mention, incidentally, that there was two types of magnesitic rocks there. One was magnesite, and the other was brucite. Magnesite is magnesium carbonate, and brucite is magnesium hydroxide. We had a contractor there, and he set off a blast. The fellow that set off the blast was inside of a little mobile house where they had a small gasoline engine, and to set off the blast, you just simply have to make contact and make a spark. He was just shutting down the engine, and this rock flew up and came right down through this little structure and mashed his head flat, right against the radiator on the engine. He was an immediate fatality.

Another one happened on the Standard Slag property, when Standard Slag was operating there. And this was a piece of heavy equipment that had about five-foot-diameter tires on it. And this young fellow, I can't recall whether he got in the way of the machine or whether he was operating it or what. Anyhow, the accident happened when one of these big wheels passed over his head and flattened his head out.

And then a couple of times, trucks would go over the dump when they were dumping waste. Vern Martin was one them.

L: That was very much later on. That was, gosh, in the late 1960s, 1970s maybe?

The two trucks went over the dump. I don't think there was any fatalities on those, but there was some injuries, of course.

F: Did you have safety training for all the employees?

Yes, we did. We not only had safety training, but we had a fellow there that gave CPR training and so forth, and quite a few of us took that. I've forgotten most of it, unfortunately, but we did have good courses in that. Yes, safety training is a must in any endeavor, I think.

F: Especially when you're dealing with heavy equipment and high temperatures.

L: How about grocerying, shopping, that sort of thing? Was that available?

Shopping—there was always a store there. It was never a company store. The company didn't believe in that. They were private enterprises. And most people made it a point to go to Fallon or Reno or Hawthorne to shop. The stores in town there did a fairly precarious business. They had to charge more, of course.

F: So they were like a Quick Stop. You could pick up a few things, but the main shopping happened elsewhere?

Yes. And then there was always a restaurant in town. In fact, there was two of them most of the time. I think I commented to you earlier on—I'm sure I did—that Gabbs was the only town that I'm aware of in the state of Nevada where there were more churches than there were saloons.

L: Oh, and also it was an incorporated city.

That's correct. Yes. Very early, after I got there, they decided they wanted to have an incorporated city, so they'd get a bigger share of the money that was collected by the county. Tonopah frowned on this quite a bit. There's two things necessary to incorporate. You have to have enough people to incorporate. The state of Nevada tells you how many people you have to have. And also, to maintain your corporate status, you have to have so many voters. And it just very recently became disincorporated; or maybe it hasn't yet, but it's in the works.

F: Because they're falling below those numbers?

Yes, falling below the legal limitation. But it was a good thing. We had all the benefits of a city—mayor, council, and so forth.

One other thing I might mention, the wells in the Gabbs area contained a lot of fluoride. There was, oh, anywhere from two or three up to fourteen parts per million of fluoride in the water. Of course, it wasn't drinkable. And the water came out of the ground hot. We had a series of big redwood cooling towers around the city there. And we would cool it for industrial use, but almost everyone had to buy water that was brought in that was non-fluoride. The children who were raised there, prior to the time

of the bottled water, had slightly mottled teeth, but I don't think any of them had to have a filling in their life.

F: They were getting a little too much fluoride there?

Of course, yes.

F: But that's a good description of what Gabbs was like in the 1960s, early 1970s.

L: When did you retire in Gabbs?

I started in 1953, in January, and I retired in 1979, in April. They asked me to stay on a few months there.

F: And did you stay in Gabbs once you retired?

No. We moved to Yerington.

F: And have you had any connection with the mining industry since your retirement?

Yes. I was listed in the mining engineers directory as a consultant, and I did a very small amount of consulting for about six years. Well, as a matter of fact, Basic did retain me as a consultant for five years, and then after that terminated I did some consulting privately, but not very much.

F: Do you stay involved at all with the Mackay School of Mines as an alumnus?

Oh, yes. I make a minor donation to the college once in a while, that's all.

L: Did you have any women employed in the mines? I know not when you first got there, probably.

Well, we had women working in the office and in the chemistry lab, but no women on the trucks or equipment, and I believe

that changed a little bit after I left. But, as an example, Round Mountain and all of the big mines in Nevada, the big gold mines, use many women in the actual operation of the trucks and so forth. And they do a great job, too, incidentally.

F: But that change hadn't happened in Gabbs yet, when you were there?

No, it had not.

F: You mentioned the dust collectors. Were environmental regulations getting stiffer while you were there?

Oh, yes. They got a little bit worse every year. Personally, I approve of it. It's something that had to come.

F: You saw it as something that was needed?

Oh, definitely. Yes.

F: Why did you think it was needed?

[laughter] Well, you heard us mention the dust. We certainly needed it at Gabbs, but we didn't do it as a result of being told to do it. We did it voluntarily, put in a dust collector and so forth. But I've attended a couple of EPA and OSHA hearings. I suppose I have a typical old-time miner's feelings about regulation, except that I state once again that I believe it was long overdue.

F: Yes. Regulation can hinder the mining.

Oh, of course it can. Like in the particular industry I was in, it can raise your costs to the point where you're no longer in a position to be competitive.

F: But yet, if it's damaging the environment, then you're for that?

Then you should take care of it, absolutely. Yes, there's a tendency to overreact on both sides—on the side of industry and the side of regulation. That's just one of the things that happens as a matter of course.

F: I'm curious about changes. You worked in mining quite a few years in various capacities. What would you say were some of the major changes that you saw over that time?

Oh, that would have to be in the equipment. There's marvelously efficient equipment being built nowadays that we didn't even dream about—the size of the haulage units and the size of the digging units. Naturally, the people who work on this equipment like to get the highest wages they can, and the unions have been very active in seeking that. But if you can move 350 tons with just one man operating a truck, well, you're money ahead, of course.

Addendum by T.M. Cahill

On October 15, 1950, the Julie Shaft at Copper Canyon Mine was set afire. Copper Canyon Mine is located about twenty miles southwest of Battle Mountain, Nevada. The blaze was started near the shaft collar, and perhaps up to one hundred feet below the collar, by a welder repairing one of the shaft's cages. Probably a shower of hot metal dropped through the safety shroud into the shaft's timber sets below. The blaze soon turned into an inferno rising more than one hundred feet into the air above the head frame sheave wheels and setting fire to the adjoining crusher building.

I had gone underground via the Virgin Shaft prior to the start of the fire. The Virgin Shaft was the nominal ventilation shaft and also served as the escape shaft in the



The Julie Shaft fire at the Copper Canyon Mine, October 15, 1950. Tom Cahill was underground at the time the fire started. The photograph was taken by Rev. Paul Mienieke, who was a houseguest of Cahill at the time. Note: The steel headframe is rumored to be the same one that was in place in Butte, Montana, in 1917 for the fire at the Speculator Shaft. That disaster killed 167 miners underground. If this is the same headframe, there was no damage to it in either blaze. If this is not the same headframe, it is nearly identical to the one that was in Butte (compared to other photographs).

event of a fire or other disaster. As events turned out, it was a real lifesaver. It was located some distance north of the Julie and could be entered from a tunnel on the 500-foot level of the Julie Shaft.

The entire crew, consisting of about 40 men, was at work on the 700-foot level of the Julie, and all hands were led to the bottom of a ladder connecting the 500-foot and 700-foot levels as soon as the fire situation developed. Smoke was a small problem un-

derground at the commencement of the blaze but was soon controlled via the strong Julie updraft created by the fire itself. Some smoke leaked through some chutes located near the fire door, which was installed near the Julie shaft on the 500-foot level. The door itself was steel and reasonably fire- and smoke-proof. Egress operations proceeded fairly smoothly until the last man up the ladder slipped when he was almost halfway up and fell back to the bottom on the 700-foot

level. He was painfully injured but was strapped in a Stoke's Stretcher and hauled up to the 500-foot level and on up via the Virgin Shaft. My last information was that he did recover OK.

I left Copper Canyon Mine shortly after the fire and went to a new job at Round Mountain, Nevada. The mining operation at Copper Canyon came to a halt, because the Julie Shaft was not usable. I never heard whether it was placed back in operation.

Two engineers—Bill Harrigan, a former shifter at Copper Canyon, and Royce Hardy—drove over to Copper Canyon and assisted in the rescue work. They were both employed at Getchell Mine about fifty miles or seventy miles west. They were able engineers, and their efforts were greatly appreciated. I might add that Elmer Snell, the mine foreman at the Julie operation, was a very capable and cool leader.

CLAUDE S. CHAPLIN

*L*YNN FURNIS: My name is Lynn Furnis, and today is September 11, 2005. I'm here interviewing Claude Chaplin about his life in Nevada and out at the Burrus Mine property, about eight miles south of Sutcliffe off the Pyramid Highway.

CLAUDE CHAPLIN: Talking about the Burrus Mine, the man that was there before the Burruses was a Frenchman named Frank Blonden. The Burruses had some claims up there that they named the Silver Bell, and they started a mine with Frank Blonden, which they called the B & B Mining Company. They mined that quite a while, and they had quite an operation going there. They hauled the ore over to Sutcliffe. At that time, the railroad was out there, and they loaded the ore on cars and shipped it to Utah, I think.

When did the Burruses have it?

Well, I don't know as the Burruses ever got out of having it, really.

Do you know when they first acquired it, though?

That was way back in about 1915. See, that was the old Burrus family there with Frank Blonden. He had his own mine there in that same area, besides the B & B with the Burruses. He had the Nevada Dominion. That's the one I had later, was the Nevada Dominion.

Blonden had a man there working for him by the name of S.R. Campbell. In about 1932, Frank Blonden was having trouble with a sheep company that would run their sheep down there and get in his water all the time. They evidently had a fight, and Blonden shot the sheepherder with a shotgun and killed him. They put him in jail, and he got out of it by self-defense, and that's when he hired Campbell to work for him at the Nevada Dominion Mine. They weren't mining the B & B at all, for some reason or other. Now, do you remember that house up there on the hill?

The one that is kind of green in color?

Yes. That's where S.R. Campbell lived. That was an old, old cabin. It was old when he got there.

Did Blonden live on the property?

Oh, he lived right there, yes. He had a house up where the shop was. I'll get into that later. But Blonden got sick, and Campbell's wife took care of him, and he died. He's buried right there.

So did you ever meet him, Blonden?

Blonden? No, he died in 1939 or 1940. I did know Campbell. He hasn't been dead very long. He was living up there, but, see, he sold out. Well, there's a funny deal on that. There was forty acres there. I never did get it straight how that came about, but anyway, the section was 6 and 15.

That's within the township range grid?

Yes. I think it was what they called a school section. See, they set that aside. For every township, they gave a school section for the people to build schools. But in 1943 Campbell went to the state, and he bought that forty acres there, and then the state, so they say, traded the rest of it back to BLM. See, this I'm not too sure about. I'm not sure that it's even legal what they did. But anyway, then Campbell claimed the whole thing in there. Then Rocketdyne came in.

Rocketdyne was a company that was making that rocket fuel and going through all that experimenting. They were getting it together over in Palomino Valley. They bought all that country out there—all Palomino Valley. Their line came clear down to Spanish Springs—all those hills and everything.

Rocketdyne moved out of there in the 1970s. I was living there when they moved out. They had bought Campbell's forty acres, and when they moved out, they sold out to McCullough, which is a big development company—or it *was* a big development company. They developed Lake Havasu City down below Las Vegas. That's where the

London Bridge is now, right on the Colorado River. Then they were also developing out east of here, too, but they went bankrupt.

Well, that forty acres that you're talking about—where was that in relation to your property, where you were living out there?

That house was on the forty acres. The way they've got it surveyed now, I think somebody screwed up on their surveying. See, the university bought that forty acres.

The same forty acres?

Yes. They bought that forty acres from the guy that bought it from Rocketdyne.

So that's the forty acres they were trying to build their mining lab on?

Yes, that forty acres. See, I knew the university people. They used to come out there all the time. They had big classes out there, and I knew all those guys. Always before, the Burrus Mine wasn't on that forty acres, but now it is. [laughter] And I get a little bit belligerent about that, because I don't think it was on that forty acres. I don't think it was ever on that.

The Burrus boys came back after the war. They both worked for the power company, and they may still be alive, as far as I know. I talked to them different times. They mined it, but they didn't live there. They always lived here in town, but those two boys mined that mine in the late 1940s, and they shipped ore up to Utah.

As far as you know, was it ever mined before the 1940s, or did they actually start the mine?

Oh, no. What I was talking about, B & B Mining Company, started the mine. Blonden and Burrus, 1915.

I talked to the Burrus boys when they came back from the service in the late 1940s. I think they were in the service, but I wouldn't swear to that. They couldn't mine it during the war.

Yes, they shut all the mines down during the war.

Yes. But then they mined it for awhile, and S.R. Campbell lived there then, too, but if that had belonged to S.R. Campbell, you think he'd have let them mine it? I don't think so. [laughter]

Were they actually mining for gold?

Mainly silver. There was some gold in it, but they mined mainly silver, and there was a lot of copper in it, too. Frank Blonden had a house up there where the shop was. Right where all the cars and stuff are, he had a house there.

You saw that big mine dump up there? That's the Nevada Dominion. That was a mine that produced, and the ore was shipped out, and that was the one he had. He had a mill up there that wasn't right on the dump, but it was on his property. But after he killed that shepherd, why, he took a trip someplace, and while he was gone, they burned his house and his mill. They figured the shepherders did it for revenge. Then he moved.

Do you remember where my place was? You look right straight across there and see those trees?

Kind of to the north and uphill?

All right, well, we're going across here like this. My house is on this road here, off of Pyramid Highway. Now, from my house you look over to the left. Do you remember seeing those tamarisk trees? There was a spring over there. Now, the other spring that

I was using, there's a big, tall tree there. It's up by the shop. You go to the shop to get to it. But this one is right straight across, and that's where Blonden's grave is. He went over there and built a house there. Then, of course, when he died, Campbell wouldn't move down there. I don't know why, but nobody lived there.

He had a bunch of different buildings there. Blonden was quite an industrious old guy. He went into the rabbit business. He raised rabbits and all kinds of different things.

When Blonden died, old Campbell claimed all those claims. None of those claims were patented, so he claimed them all, and in the 1950s he moved the mining company in there, MP&H, which is Miller, Pefick and Hudlow. They moved a whole bunch of equipment in there, and that was in the first part of the 1960s, I think. I don't know whether there's any truth to it or not, but as the story goes, Hudlow took all the money and gambled it away, and they went broke. Pefick, one of the other partners in that mining company, died there. Pefick owned a lot of those patented claims there.

Those guys were more or less local. One of them, Miller, was from Herlong. Pefick was from there, and Hudlow was a promoter, and it's hard to say where he was from. [laughter]

So what brought you out there to that property, and when did you come out there by the Burrus Mine?

Well, I had a number of different jobs first, and when I got out there around 1969 or 1970, I didn't go to the Burrus Mine. I went to the Bluebird, and it belonged to a man by the name of Pete Karasevich. He was in a rest home here in Reno. I stayed there, and I did a bunch of work on the place and up on the dump. He had an upper tunnel and a lower tunnel. It's just right around the corner from the Burrus Mine. You go up to

the head of the canyon; then you can just go right around like that, and you come right to it.

To the left?

Yes. They could shoot back and forth at each other. [laughter] And they did.

I went to the Bluebird for awhile. Then when Rocketdyne moved out, why, I knew the property manager for Rocketdyne, and I knew a bunch of their cops, too. Hell, I could run all over that country out there. I went to places where nobody went. When they were going to move, I talked to Campbell, the property manager—his name was Campbell, too—about what they were going to do with those unpatented mining claims.

He said, "Just let them go back."

I said, "Now, is it OK if I go ahead and take them up?"

He said, "Yes, you go right ahead and take them up," which I did. I took up the Nevada Dominion then.

I first went to the Bluebird about 1969, 1970, 1971. I probably was over there by 1972, because I went over there right after Rocketdyne moved out. I traded the Bluebird for a piece of property in Sun Valley, and there was a trailer and everything on it, so we moved into there then.

We had two dogs and a cat, and at that time you had to keep your dogs tied up. Well, my dogs had always run wild out there, you know. They just went where they wanted to go, and I wouldn't tie a dog up, anyway. I like dogs too well. So I said, "Well, I'm going to make some changes here." So on the property where the house is now, on the Nevada Dominion property, that used to be three buildings sitting there.

See, where I was living, that's on Nevada Dominion property. That isn't on Burrus property. I had a little D-4 Cat, and I went in, and I picked the middle house up and turned it around, and then I put it together

with the other house. That's where the house came from. I went ahead and did all the windows and all that kind of stuff. Of course, there's another set of windows in it now. The ones I put in were all aluminum frames, but these were put in when I got back from the hospital. My neighbors from over at Sutcliffe and all around the country, they came in there, and they put those new windows in, and they redid the floor. Now they're double pane. Oh, yes, sliding windows, door—they did all that.

There's just one bedroom in the house, and just a kitchen and living room. It was all one piece. The bedroom was one piece, and then the bathroom.

You've got an indoor bathroom?

Oh, yes, I had a bathroom. You bet. Running water from the spring. Well, there's an outhouse there, but, see, I put a thousand-gallon tank up there at my spring and piped it to the house. So I had water down there, and I had everything there.

I was married when I went out there. Jeannie was my wife. We got married right here in Reno in 1965, I think it was. Her maiden name was Norquist. She would have been part Swedish.

Her people were old-timers in Eureka. Her grandfather came over there as a young man, and he headed right for Eureka. He wanted to go where the timber was, so that's where he went. He worked there for that one timber company that had been there for a hundred years or more. His would-be bride was still in Sweden, so he made enough money to send her the passage. She came out to San Francisco, and he met her there, and they got married. They moved back up to Eureka, and that's where they stayed. And that's where they all died, right there.

You were already married before you went out to the Bluebird?

Oh, yes. I was married in 1965. She was with me all the time running around over there.

So for awhile, once you were out there off of Pyramid Highway, first you were at the Bluebird, then you moved to Sun Valley?

Yes, and then I moved back out to my claims on the Nevada Dominion. I fixed that house up so I could live out there, and I got water to the house. I had a generator there. I could make all the electricity I wanted. In fact, the generator is still there.

Were you doing mining on that property yourself?

Oh, I did a lot of messing around. I put that pilot plant in, a cyanide plant in the shop there. I had two one-ton vats, and I put all the pumps in there. I came to town and bought my cyanide from Sierra Chemical. I bought my dynamite from them, too. I had them both, you know. I had to have dynamite. [laughter] I fiddled with it, and I found it worked.

Were you experimenting with ore that you had dug up?

Yes. I was working all the time. I did machining work for different places in town here, the big truck outfits. I worked in here, and then I did all the repair work on the Indian tribe road equipment. I did all the work on that when I had the shop going there, and so I was busy. I worked, and I worked hard.

So when you did do your experimenting with the cyanide? That would be on weekends that you'd do that?

Oh, no. No, it was going all the time—day and night. Hell, I'd come home from work and go up there and work. It's

something you can't just shut down. You have to keep your pumps going. I had that big generator up there, and I had three pumps pumping from one place to the other. You see, you pump it through. You circulate it—round, round, round, and through it—then when your liquid gets pregnant, why, then you put it in a bathtub, which is real shiny white. I ran liquid into that and put some sodium sulfide in it, and that sodium sulfide made the silver and everything just drop right out. Then you could decant the water from it and pick up your black goop, and then you'd go from there. And it worked. I say it always worked.

When you say the liquid was pregnant, that meant full of silver?

Yes, that's when it had the maximum amount of silver that it would hold, and then you could test it and find out if it had any more left in it. If it did, why, you could run some more cyanide through it.

So once it was the black goop in the bottom of the bathtub, then what did you do with it?

What did you do with that? I cooked it. [laughter] I had a little furnace. And you see this piece I have here, it's a mortar. That is old. I found that one day.

But is this for processing ore? Is this for doing assaying?

Well, no. Every prospector had one of those. I found that one way out there next to an old diggings, and it was buried clear underground. I thought it was an old tin can, and I kicked it. Now, this lip here originally was a great, big round thing.

So this is a really heavy, heavy iron mortar. They would use this to pulverize some rock?

Well, they'd beat it like that until it got down so fine, then they'd grind it. Then they'd pan it to see if it had anything in it. I looked and looked, but I never could find the pestle that goes with this.

So they would use the mortar just to pulverize, or would they put heavy chemicals in there, too?

Sometimes, they would put mercury in there. After it got down so far, they'd put mercury in, and that mercury would pick up the gold and the silver both.

I had another one that I gave away, but it's ceramic. There's one that you put in your furnace, a little one.

Little ones made of bone ash or something?

Yes. Well, most all of that stuff is made out of bone ash.

Does it absorb the mercury? Is that what it does, and it leaves the metal?

Yes. It absorbs everything but the silver. When you do it that way, to clean it up, then, you can also digest it with nitric acid. See, you can't dissolve gold with nitric acid. It won't eat gold. But now, you mix nitric acid with sulfuric acid, and then it'll eat it. [laughter]

I had books and books and books. I mean, I had a whole miner's library, and I mean real good books. See, I had everything to mine with. I had a crusher and a ball mill. In fact, I made a good ball mill, and I had a jig. Oh, I had all kinds of things—jackhammers, and just about anything you needed to mine with, and a big compressor.

Did you ever have anybody helping you do any of the mining or the ore processing?

No, I did it all by myself.

Did you ever end up with any big silver ingots?

No. [laughter] The only silver ingots that I ended up with, one of my nieces got one, and a granddaughter got the other one. See, in the summertime, my brother and his family were campers, and they liked to come up there, and they'd camp under the trees where the spring was. There's water there and all that. My niece was interested in everything. She wanted a horny toad, so we finally got her a horny toad. And she was interested in arrowheads. I used to have a whole gob of arrowheads that I picked up in the desert in eastern Oregon. She wanted arrowheads, so I gave her arrowheads and a bunch of stuff like that.

I gave her some calcanthite, and I told her, "Now, with this calcanthite, you can't put it out in the sunshine or out where it's light, because it'll turn white and go away." Calcanthite is a copper ore. It isn't really an ore; it's a deposit. Well, in these old mines, if there's any copper in there, they'll sweat, and the moisture will come out, and it makes a mineral. It makes calcanthite. But anyway, it's copper, and it turns a real pretty green and pretty blue.

Is it little, tiny crystals on the outside of the rock, and then it just rubs right off?

Yes, that's calcanthite. I told her what it would do. They lived in San Jose, and she took it home and put it in the refrigerator, and that way she could open her refrigerator and look at it every once in awhile. [laughter]

Now she is a professor at Yale, and she was interested enough in things, so she did something with it. She first went to a southern college, and she was there for two or three years, and then she went up to Yale for some reason, I don't know why. I lost track of them. I just never got along with

that brother. I didn't amount to much to him. I didn't amount to much—I'll go along with that—but I didn't like to have it rubbed in. [laughter]

How long did you keep mining and milling like that?

Well, I got so busy doing other things that I just couldn't do it anymore. In fact, I lost a lot of interest in it, too, after I found out I could do it. I did a lot of things like that—found out I could do it and then lost interest in it. [laughter]

When you were living out there on the Nevada Dominion property, was any mining going on nearby on the property around you?

No. There were some people living out there. Old Slim Curtis lived out there. Oh, he diddle-daddled around, but he just dug a hole in the ground. But he had pretty good copper ore.

You mentioned S.R. Campbell earlier. Was he living there at the same time that you were living there?

Well, no, I wasn't living there on that place. See, he had those claims claimed through Rocketdyne. So I had to wait until Rocketdyne got out of there. And then Campbell died.

So then you went after the claims?

I had already talked to the other Campbell, and he told me to go ahead, so I did. I went ahead and filed. In fact, I was the first one. See, in 1970, I think it was, they made a law that instead of doing discovery work by digging a hole in the ground, which you didn't need, you drew a set of maps. So I drew the first sets of maps

for that outfit. I drew the Bluebird maps, and I drew the Nevada Dominion maps and turned them in. They're downstairs there in the courthouse someplace.

Nobody lived up there. I ended up with all of the Nevada Dominion claims.

And the Burrus Mine claims, also?

Well, I have my claims up there. Yes, my claims run right over the top of them, so I had no idea. See, I went right across that forty acres, and I finally got a letter from BLM that said I couldn't claim a mining claim on private property. That's the only thing I ever heard about it.

So the Burruses weren't mining up there anymore?

No. I don't know what happened to the Burruses. Now, they came out there, oh, hell, four or five times. I talked to both of the Burrus boys, and, as I say, I think they both worked for the power company. We had quite the conversations there at different times, but they didn't seem to be interested in the mines.

Actually, the mines belong to their mother. A nephew of theirs used to come out there, and he used to do the assessment work on them. They always had water and all this kind of stuff. He'd come out there and camp around, and first thing you know, he'd be down at the house doing things. But then I don't know what became of him. See, I just lost track of all those people. I was going to look them up in the phone book and find out if there's Burruses around yet.

How did the university acquire that land?

They bought it from Rocketdyne. Rocketdyne bought it from Campbell. See, Campbell bought it from the state, and then when Rocketdyne came out there, he sold

out to them right away, because people were kind of bitter about them wanting to buy the whole thing. And that's what they wanted—they wanted everything out there.

What were they doing with the property?

Well, they wanted the people out of there. They were afraid of explosions, and it was all secret, too. See, they had enough cops out there to run the place.

Did they have a factory or a plant or something out there?

Well, no. They evidently were manufacturing whatever it is that they use for fuel. I have no idea how they were doing that. But they'd tie one of those rockets down and fire it just like they were going to shoot it, and you could hear it for ten miles, the roar. Now, everybody says they didn't shoot it off, but I think they *did*. They had another piece of property up out of Lovelock across Ragged Top Mountains up there. On the other side of that, there's a big flat, and they had a big piece of property in there, and they were more secure on that than they were on this property down here. So I think they were shooting the goddamn things over there.

Over to that other property?

Yes. But then when they left there, they were hauling one. It was about thirty, forty feet long. She was a big thing. To test them, they'd just set them there, and they'd tie them down, and then they'd shoot them. Of course, they were tied down; they couldn't get away. But that was the reason that they wanted the property.

When did you build your shop out there?

That shop was already there. MP&H built that. It was a big sheet-metal building. All I did was put the stuff in it. I had those big cyanide vats in there.

Then did you do other things in the shop?

Well, not while I was doing that. But when I got through experimenting with that, why, then I moved all that stuff out. In fact, the vats are still laying up there. Then I put an overhead track in it, put a trolley on it, and that way I could put up my chain hoist, and I could pick an engine up and move it wherever I wanted it—in or out of the car or out of the grader or whatever I was working on. I worked on graders and Cats and every other darn thing out there.

So, you were using your shop then for your mechanic work?

I had a welder. I've got a barbecue that I made. I've got stuff scattered all over. I mean, I had a lot of good stuff. I had tools, big tools, big wrenches.

Had a welding outfit. I quit welding, though, when I had my eyes operated on. I sold my welder, so I wasn't going to fool around with it. I used to do a lot of welding, fabricating building stuff, and I was pretty handy, you know. It was a handy thing to have around.

When you lived out there, did you spend much time at Pyramid Lake?

Oh, yes, I did a lot of fishing over there. And we had a party in the bar. Those people gave me four birthday parties. Hell, all the Indians in the country came, and all the white people in the country came, too.

All over at Sutcliffe?

We had one hell of a party. Yes, I was pretty popular out there. [laughter] I had a lot of fun.

J. ALAN COOPE

VICTORIA FORD: *Today is November 16, 1998, and my name is Victoria Ford. I'm here with Alan Coope in his home in Tucson, Arizona. We're going to be talking about the Carlin Gold Mine today. Let's start with your date and place of birth.*

J. ALAN COOPE: I was born in Derbyshire, England, a town called Ripley, in May of 1935. I went to the local council school, as they call it, from age five to about age eleven, and then the local grammar school, which was Swanwick Hall Grammar School. I was there from age eleven to about age eighteen, and from there I went to university. Swanwick Hall Grammar School was one of the traditional schools of the day. Instead of grades, we had forms, so you're in form one, form two . . . form five, form six, so quite different from the educational system in North America.

During my time at Swanwick, the geography master was interested in geology, and since I seemed to be interested in rocks, he kind of encouraged me. Really, I owe to him, if you like, my career—in generating that interest in geology in high school.

Because you were interested right away as a kid?

That's right. I was interested in rocks, and when I went to university, I went to university to study geology, initially. I went to King's College in London, London University, and my undergraduate degree was in geology. After I graduated, I had the opportunity to move over to another college in London University, the Imperial College, to study geochemistry.

Geochemistry was a new field that was developing at that time, especially as it related to prospecting for mineral deposits. And the professor at Imperial College was actually in the Royal School of Mines, which was a college within that college, which specialized in aspects of mining. He was pioneering the field through the Royal School of Mines, mainly through doing research in Africa. The work was supported by mining companies based in England—in London—that were active in South Africa and some of them in Australia. Most of the research that we were doing through the university at that time was in Africa—East



J. Alan Coope

Africa, Central Africa—not so much South Africa, but some in South Africa.

As a graduate student, were you able to go there, then?

Yes. Well, I started Imperial College in 1956, and almost the whole of 1957 I spent in Africa. Three months in Bechuanaland (it was then), and now it's Botswana. I did some work there with the Botswana Geological Survey. I was way up in the northeastern part of the country and studying the dispersion of nickel and copper. Dispersion is the way the metal moves when it's eroded from the rocks and is weathered and gets distributed in the soil. It gets into the stream sediments and gets carried down stream and so on and so forth. So, you study those patterns, the idea being to interpret those patterns back to the source, so that when you do a regular survey, and you recognize these patterns, you can pinpoint where the mineralization might be. And that's a discovery, you know. Very similar to the concept of gold panning, although we're using chemistry rather than the physical pan, which concentrates the gold. The gold panner went up the streams until the colors

disappeared, which means that you've passed the source, you see. So it's a similar concept, but a little bit more high tech, if you like, especially in the 1950s.

So, we did that survey of three months in Botswana, and then I moved up to Tanganyika, which is now Tanzania. Spent a little longer there—six or seven months—by Lake Tanganyika on a project. And during those two periods—three months in Botswana and six months, seven months in Tanganyika—I collected samples, data, and everything, which I took back to Imperial College, and that was the basic information that I used for my Ph.D. thesis. So, in 1958 I was working with that, analyzing it in the labs there at Imperial College, and eventually writing it up, which I did. I completed it in the latter part of 1958, which is forty years ago.

You completed your studies in 1958, and then where did you go from there?

Well, when it became apparent that I was going to finish the thesis, it was the end of 1958, and I started looking for a job. As it turned out, Newmont was starting up a new program in the Philippines, and they approached my professor at Imperial College. His name was John S. Webb, and they asked him if he would be a consultant on a program for geochemistry.

And is he the same one that was pioneering this geochemistry?

Same one, yes. John Webb was very busy, and he said to Newmont, "Well, there's a young fellow here finishing up his thesis, who is looking for a job. Would you consider him for the position?" So Newmont agreed. I got a contract for eighteen months to go out to the Philippines, provided I was there by November 1, to do this program. So that's how I started with Newmont. I made it, arrived in Manila on November 1, and went to

work there. I didn't stay eighteen months in the Philippines. We finished the job, or the job I had to do, in seven months, and then Newmont brought me back to North America. They honored the eighteen-month contract and then tore it up, and I became a regular employee after awhile.

Under contract were you a consultant?

Just an employee.

But not a permanent employee. I see.

Of course, you can understand that—they didn't know me very well. And they didn't even interview me before I went out there.

On the professor's word.

Just on the say-so.

So this geochemistry was a brand new thing, and you were able to use that with Newmont, then? You were following that method?

Yes. Newmont got quite a large program on the Island of Cebu in the Philippines. They were looking for porphyry coppers, which, at that time, were prized deposits of the copper source. You can get porphyry coppers all the way around the Pacific Rim. There's some right outside Tucson here, quite big ones, copper mines. And so, we were doing exploration in the Island of Cebu for more of these deposits. We found quite a bit, in combination. The techniques worked very well. And this was quite good for Newmont, because the more they found, the greater the interest they got in the copper company in the Philippines. Eventually, they developed a lot of this copper reserve and changed the mining method they were using and built it up, so it was running very well. Eventually, they sold their interest,

sometime in the late 1960s, but, at least, they developed that copper deposit in the Philippines, and the Filipinos did quite well at it.

Was this the first that Newmont used the geochemistry, or had they been using it before?

They had been using it, but on a very limited scale. It was the first full-scale program. In fact, I'm quite sure, it's the first full-scale program in geochemistry that was done in the Philippines. At that time, it was kind of a new field, and it was quite successful. In fact, a few years later, the United Nations did quite a program through the Philippines and one or two other countries to help develop these underdeveloped countries by doing these surveys, using types of techniques similar to the ones that we used.

Since it was new, were you the only one with the educational background in geochemistry?

Yes. I was training local Filipinos. There's things to do. There's a right way to collect the samples in the field. There's a right way to treat them and then a right way to analyze them. So I was training people to collect samples and, also, how to process them before they go into the chemical lab. We had one fellow there who trained as a chemist to work in the lab. So, that worked out very nicely.

We finished that job in less than eighteen months, and Newmont brought me back to North America. They sent me to Vancouver, British Columbia, because I was still using a British passport at that time. I worked a little bit out of the office in Vancouver; Newmont had an office there. But they eventually got me a green card, and I was able to work in the United States, initially in Alaska, but later on I came down to Nevada, about 1960-1961.

Are you a U.S. citizen now?

No. I've got a green card. I've got a British passport and a Canadian passport.

I don't know about green cards, I guess. Is there a time limit on that?

No.

Once you have it, then you can be here as much as you want and work here?

I am eligible to become a U.S. citizen. We've talked about it, but we haven't done it yet.

So, from Alaska, was that when you came down to Nevada?

Yes, the first time. I came back to North America in the middle of the summer of 1959, and I spent the balance of that summer up in Alaska. I actually came back to live in Spokane. And the following year I was in Alaska again, in 1960, for the summer. It was towards the end of 1960 that Newmont indicated to me that they'd like me to do jobs in the western United States, and this developed in the early part of 1961, really.

At that time, were you aware of the microscopic gold and the exploration that was going on in that area?

No, but we were reading the literature, because it was in 1960 that Ralph Roberts published one of his papers. Before that he'd published a lot of others and also given several talks about distribution of mining districts, including gold in Nevada, because he worked with the Geological Survey, USGS. I think he started his mapping in 1939 in Nevada, because we were there in 1959-1960.

So, you got twenty years of mapping in Nevada, understanding geology and structure of northeastern Nevada. Roberts was observing the distribution of the mineral deposits in the mining camps in that part of Nevada and relating them to the geology that they were mapping, and the structures. It was really in the latter part of the 1950s that he published a paper, which I have a copy of here. It generally describes the geology of the region, which is something that I read, and we were interested in, because it is a mineralized region. Then in 1960 he came out with this short paper here, which is entitled—I always remember this—"The Alinement of Mining Districts in North Central Nevada." It's Ralph Roberts. You see the spelling there?

A-L-I-N-E. [laughter] Interesting. Misprint?

In all the references it's spelled this way. But anyway, this is a short note, no more than two and a half pages, including one whole page with a map, which describes some of these alignments. And this caught our attention. When I was working out of Spokane, when Newmont geologists got together, we used to talk about this work that was being done. At that time, although I hadn't met him, John Livermore, who was working in Nevada, was communicating with the people I was communicating with and inputting some of his ideas, which were developing at that time. So really, it kind of grew on us, and there was no surprise to me that he was told, "Well, we've got a property down in Nevada, and we'd like you to go and take a look at it, see?"

Was this exciting to you, what they were mapping out?

Yes, but it became much more exciting later on. I'd say it was interesting and intriguing. And then the excitement followed.

So, you had not met John, but the two of you had heard of each other at this point, working for Newmont?

Yes, sure, because Newmont wasn't a big company like it is now. You could probably write all the employees' names down on one page of a notepad.

So, they sent you from Washington down to Nevada, and that would have been 1960-1961?

Yes, 1961, my recollection there. At that time I met Pete Loncar in Washington, because he was working at a uranium mine there. In some of the early investigations we did in Nevada, Pete was with me. Gradually, I was meeting more and more of the U.S. personnel in Newmont, because I was very much the young fellow on the block. Eventually, it culminated in John Livermore and I coming together at Carlin in June of 1961. I can fill in some background for that previous six months. John was working down at Eureka in Nevada, on what we called the Ruby Hill project. There were several mining companies involved, but Newmont was manager of the exploration phase, and John was the manager on site. The interest there was the zinc potential of the Ruby Hill Mine. They did quite an extensive drilling program, which wound up in May or June of 1961. Now, while John was supervising that project, he was interested in gold in Nevada. His interest had been stimulated by publications that he'd read, oh, in the 1940s, and that's where some of the initial records were, at least in the Nevada literature, of which we call invisible gold.

In the 1940s?

Yes. But the actual publications were written in the late 1930s by this Vanderburg.

So, this was not a brand new idea in 1961. It had been around.

Yes, it was known, but it wasn't widely known. You have to remember that gold in 1960 was thirty-five dollars an ounce, and during the war years, of course, soon after these Vanderburg publications came out, gold mining went into a tailspin, and a lot of the gold mines closed. Gold mining didn't really get revived after the war, either. The main push was in base metals and things like that in mining. So, you're going through a period of low interest in gold, say, from about 1940 right through until the 1960s. Not that there weren't "gold bugs" around. There were lots of prospectors and people like that, but it really didn't attract the major companies and a lot of money. There was the Homestake Gold Camp up there in the Dakotas, which kept going, but, generally speaking, gold was not a target of interest in those years.

Primarily, because of the price of gold and the cost of getting it out of the ground?

Yes.

John had been interested in the gold?

Yes. John graduated from Stanford probably around the early 1940s or so. He was always interested in prospecting, but he knew of the Vanderburg publications during the 1940s and always remembered the potential that was indicated in Vanderburg's observations. So, John brought that to Newmont when he was working out of Eureka, and he was able to visit some of the prospects, properties. In fact, early on, he worked at one of the mines there where they had this fine-grained gold. This was even before he started with Newmont. But later on, and again when he was with Newmont,

he was able to visit one mine where they were mining this kind of gold. We called it the Big Gold Acres—sometimes called the London Extension—and that mine was mining low grade gold at that time, more or less, just trading dollars. It eventually closed. It closed soon after John and I got together on our program, and we went to the sale—like they sold off all the equipment. So, kind of a sad day for a mine, but we were there. That would be 1961, when the mine closed.

He visited that mine and talked to the manager, Harry Bishop, who lived in Battle Mountain. They were talking about the fine-grained gold, and John asked him where he would go, if he wanted to find more deposits like this one. To John's surprise, he didn't say, "Well, look around here in Lander County"—because that's where Gold Acres is, in Lander County. He directed John to Eureka County, north of Carlin, north of the highway, and, primarily, because there were other people in Battle Mountain who had gold prospects in that area, in the northern part of Eureka at the Bootstrap and Blue Star and places like that.

Marion Fisher of Battle Mountain was one of the active people interested in that area. Harry Treweek, who didn't live in Battle Mountain—he lived down at Gold Acres there—was involved. There was another gentleman, Taylor, who I never met, but there were three of them that were involved in the Bootstrap and had knowledge of the Blue Star. They were finding gold in these areas where there was, shall we say, limited production in the past. In fact, the Bootstrap Mine was originally located as an antimony prospect, and the Blue Star was originally located as a turquoise prospect, and then, eventually, someone analyzes the rock for gold, and, lo and behold, you get positive results. Like in the report here, I got the details. But going back to Harry Bishop—he knew about that, and he knew they were finding gold up there, and that was probably

the main reason he directed John to that area north of Carlin.

Were you there when this conversation took place?

No. No. This is what John tells me, and it was several months later that John and I got together, but you can understand, John was bringing together all this intelligence and information, and he was building a proposal to present to Newmont to spend some time looking. It was that proposal that really started what you might call the Carlin Exploration Program.

Now, meanwhile, I was working over in the Battle Mountain area, near Valmy, looking at prospects—and Buffalo Valley and also Marigold. Marigold was a prospect at that time; it wasn't a mine, but we were involved, and Pete Loncar was with me part of this time. Another gentleman, Mort White, who lives in Elko still, was working with me, and we surveyed and sampled, and I mapped the geology and so on. We figured that the gold there was not economic at thirty-five dollars an ounce, and those surveys that I was doing were coming to a close around May in 1961. So then, I was asked by Newmont to join up with John Livermore in Carlin and follow John's program, which is the one he built up from all the research and discussion that had gone on while he'd been based in Eureka.

I want to ask you about the surveying that you were doing in Buffalo Valley and Marigold. Were you also looking for the microscopic gold there?

Looking for gold, yes. I hadn't met John Livermore at that time, but from talking to Bob Fulton, who talked to John Livermore, I was aware of these things. Yes, we were looking for gold and looking for gold that might have been overlooked. One thing we



The Bootstrap Mine. *"The Bootstrap Mine was originally located as an antimony prospect . . . and then, eventually, someone analyzes the rock for gold, and, lo and behold, you get positive results."*

weren't able to do in that time, because of the price of gold, is look out in the valleys under the cover, because to include the cost of removal of the overburden, before you mine that kind of gold, is very high.

At the price of gold as it was, you couldn't afford to look in the valleys?

Yes. We were restricted. The word that's in my brain here is environments; the situation was restricted in the number of situations that we could reasonably expect a profitable mine at that price, and under the gravel in the valley was not one of those places. So, we looked at the old prospects and learned as much as we could about the geology at that time, but we concluded that what was there was not economic.

Now, of course, since that time, when the price of gold has gone up, people have found more deposits under the alluvium there, and they've made money at it and still

do. So it just goes to show, time's on your side sometimes in things like that.

And the world market, too. When the price of gold changed, that made a big difference in what was happening.

The price of gold started to move during the Nixon years, in the early 1970s, because it reached a peak about 1980. We had \$800 gold for awhile.

That's incredible. So, once you realized that Buffalo Valley and Marigold were not going to be economically feasible, what happened then?

Well, I was told to go to Carlin, meet up with John Livermore, and work with him on what turned out to be the Carlin Project, based on John's recommendations to Newmont, and that was based on all the research he'd done before that. So, when John

and I came together, it was June of 1961, and we started out looking at that country north of Carlin. There are two situations that we were able to start work on right away. There were some claims in Maggie Creek, which was about seven miles north of Carlin, near to where the Gold Quarry Pit is now—claims there that Newmont had made an arrangement with the owners for us to examine. So, we'd go in there and map and sample.

At the same time, there was a group called MM&S, which was a small mining group, locally controlled, that had tied up the Blue Star property. They had got some financing through a person in Salt Lake City by the name of Blake Thomas and a company called Combined Production Associates, and they were financing some development at Blue Star. They were having trouble; like, they weren't making money. They had some metallurgical problems. So they asked, since Newmont was in the area, if we'd look at it. We said yes, because this was another opportunity to take a good look at this mineralization.

Remember I told you that Blue Star originally was a turquoise prospect. The ownership of the Blue Star claims was with the Edgar brothers, and again, they were in Battle Mountain, but they were interested in the turquoise. They used to dig out the turquoise and ship it off to Los Angeles, and they did pretty well out there. This was before the time synthetic turquoise came in, you know, so they used it for the tourist trade, but they were shipping this stuff down to Los Angeles and selling it there and doing OK.

I think it was Marion Fisher, who went up to Blue Star when they were mining the turquoise and sampled some of the rock and analyzed it for gold. It ran quite high grade for gold. So this was, essentially, the discovery of gold at Blue Star, which was in the 1950s. When we got there in 1961, there was MM&S and Combined Production Associates

trying to make a gold mine on the Blue Star. There's a lot of fine material in the ore there—clay material—interfering with the metallurgical treatment, so they weren't able to extract the gold as quickly as they had hoped they would. So we went in there and looked. John and I spent about three weeks—all day, everyday—on that property mapping the geology and sampling it and understanding the geology and its distribution and the distribution of gold. This is when we made contact with Harry Treweek to do our assaying.

Harry Treweek was still living down in Gold Acres, and we had to take the samples down there, so we went down there a couple of nights a week—take the samples and get the results from the previous batches we'd taken down. So, that's the way we developed the relationship with Harry Treweek, which was very important. Harry was a very good assayer. Also, it enabled us to control the publicity, you see. If we were shipping out lots of samples, people would begin to notice. It wasn't necessary to let people know that we were shipping samples. We'd just throw them in the back of the pick-up and cover them up with a tarpaulin. We didn't have to go to the post office or the freight office to ship them out, you see.

People knew we were poking around there, because they saw us, but there wasn't a general knowledge of the scope of the work that we were doing. Anyway, at the end of that three weeks on the Blue Star, we'd concluded that the ore we could estimate was about half a million tons of material that was probably economic. That was quite a bit at that time. In order to prove more, we had to do drilling and a lot of more sophisticated work. Before we could do that, we had to have an agreement with the owner, or, at least, the people who controlled it.

I want to understand. The people who owned the Blue Star were the Edgar brothers, and they asked you to come in?

No. It is complex. The Edgar brothers owned the property. MM&S made a deal with the Edgar brothers to develop the gold, and I remember part of that deal was that the Edgar brothers said, "Fine, you can have the gold, but we want you to collect the turquoise for us." So they had to separate out the turquoise, which wasn't too difficult, and the Edgar brothers used to come and collect it and ship it off to Los Angeles, you see. So, the Edgar brothers were still producing turquoise, although MM&S could keep all the gold. Combined Production Associates had given MM&S money to set up their plant and operate, and Combined Production was hoping that the profits would repay the loan and generate profits down the road. So, it was really MM&S and Combined Production that came to Newmont.

When you and John came in, you found that this was economic?

Well, we didn't really find that it was economic. We found that it was potentially economic. The person that John and I were reporting to during this period was Fred Searls, Chairman of Newmont Mining. [Fred Searls Jr. was Chairman of Newmont Mining Corporation from 1954 to 1966.] He'd been with Newmont a long, long time.

Fred Searls came up to talk to the principal of Combined Production, because the MM&S people were there at the same time, to negotiate a deal. John and I were sitting there in the same room listening to the negotiations, but Fred Searls and Blake Thomas, who was the Combined Production person, couldn't make a deal. As I remember it, Blake Thomas would have liked to get a nice sum of money up front, to repay the loan and so on and satisfy his shareholders. Newmont wasn't prepared to put up quite so much; they wanted to stage it over a period of time. So, those negotiations kind of broke down. We had to walk away from Blue Star.

But we also had another property, which I told you about, the Maggie Creek, which we could do some work on. Also, we decided, since we'd learned quite a bit about the geology of these deposits from the Blue Star, to extend our exploration program into undisturbed areas along what is now the Carlin Trend.

The Bootstrap Mine to the north was held by another group, and we didn't have any arrangement with them at that time. We could walk up there and look at it, but couldn't work at it. So, we covered all the areas in between, in prospecting. We had some geological criteria that we could follow. This was a lot of the geology that Ralph Roberts had developed, and we recognized the same features, and, of course, we could extend these. Do you want me to discuss the geology a little bit, very generally?

I'd like you to describe that a little bit, yes. Let's go into that in a little detail.

The work of the USGS, like Ralph Roberts and his colleagues, determined that many years ago in geologic time—this would be about 200 million years ago—there was an orogeny in Nevada. Essentially, the rocks in the western part of the state—say Winnemucca, west—were thrust by the force of the earth movement over the rocks in the eastern part of the state, and it's quite a movement, you know. Rocks were moved, in today's distance, probably 100, 150 miles, over a thrust. I mean, there was a fracture there, which was a thrust fault.

So these rocks were moved right over, and that thrust turned out to be named the Roberts Mountains Thrust. It was first recognized in the Roberts Mountains, which is just north of Eureka, between Eureka and Carlin. Subsequent erosion of the rocks on top [from the west] has exposed the original rocks underneath [from the east], and these rocks looked quite a lot different. The rocks from the west were shales and cherts, which

are kind of dark, kind of lithologies. Over in the east, there were more limestones and quartzites, which are lighter- colored rocks that form cliffs and things like this.

When you eroded off the western facies, as they called them—these are the rocks that came from western Nevada—you opened a window which exposed the carbonate and the quartzite rocks underneath, from the eastern facies. So, that's the origin of the windows that you've probably read about. What Ralph Roberts describes in his papers in the 1950s is the windows. Essentially, what it is, is you have these rocks from the west pushed over the rocks in the east, and then erosion took place—plenty of time to erode these things. The limestones and the quartzites are now poking up through the western facies, which is still draped around the sides in a series of windows. These are the things that, of course, Ralph Roberts and his colleagues mapped. So, that's the Roberts Mountains Thrust, separating the two types of rocks. You have the limestones and the quartzites, which are down below in the lower plate, and the shales and the cherts and things that were thrust over from the west, in the upper plate. So, you have an upper plate; you have a thrust; you have a lower plate.

At Blue Star, we determined that the mineralization was very close to the Roberts Mountains Thrust, as we understood it at that time, and so we were able to go out and map the contact between the shales and the cherts in the upper plate, and the limestones and the quartzites in the lower plate. We could walk along the ridge and follow this from the outcrops on either side. So it was relatively easy to do that, to locate yourself on that thrust. We looked for evidence of mineralization, of course, as we walked along there.

It didn't take long, a couple of months or so, before we started picking up some indications of gold. We were still sending samples off to Harry Treweek on a regular

basis. Some samples of rock, which contained gold, turned out to be the location of the Carlin Mine. When we got the initial indications, we'd go back and resample, because we got gold values again, which confirmed that it's the real thing. So, we started focusing our attention on that local area, and we got down to detail and did detailed mapping as we had done over at the Blue Star earlier, using just a Brunton compass and pacing [determining bearing by Brunton compass and distance by pacing].

We spent several weeks mapping these rocks and sampling and so on, and, also, taking note of where the property boundaries are, things like that, so we'd know which land was available for staking. So, this consumed a big piece of the summer. We were also doing some work on that Maggie Creek property that I was telling you about, down near where Gold Quarry is now. So we were fully employed. We were busy.

We stayed in Carlin because at that time both John and I were single, so when we arrived in Carlin, that's where we stayed—about six months or so. So that was the beginning of what you might call the Carlin discovery and some of those initial finds on the top of the ridge where the mine is now. We mapped it in detail, and later in that year—I think it was October—we staked the claims. Why we waited so long to stake the claims, I don't know.

That area was not staked? That was open and available?

Yes. Now, in that part of Nevada, when they put the railways through, the railway companies got land on either side of the rail line, and you have this checkerboard ownership pattern, so some of the land where we were working was initially deeded to the railroads. Now, after the war, the railroad sold off some of that land to ranchers. The TS Ranch, which was just west of where we were working, had a huge acreage of this check-

erboard ownership with grazing rights in between, and they, of course, owned the mineral rights. The TS land was in the area, too, and we couldn't stake the TS land. We just staked the sections in between. Later on, Newmont was able to make a deal with the TS Ranch, so that they could mine on that property, as well. That's another long story, and I really wasn't part of that. I remember the beginning of it, but wasn't really part of it.

So, we staked those claims in October of 1961, and we had to prove discovery. This was all part of the Mining Act, so we brought in a bulldozer to dig some trenches. As a result of our mapping, we had some areas that geologically were interesting, so those are the areas we trenched. The bulldozer trenching was quite successful. One of the trenches we put down across a dike, which we were able to map, and we thought perhaps the dike had something to do with the mineralization. We put a bulldozer trench across this dike and the rocks on the other side of the dike, and we found low-grade gold values in the dike, but we found, oh, about 80 feet of .22 gold in the rocks on the side of the dike. That was the best indication of gold that we got to that time and very significant. That was a good value. That was certainly ore grade at that time. Just checking the report I wrote here—yes, in here we say, "Mildly hornfelsed sedimentary rocks adjacent to the eastern contact of that dike assayed .20 ounces of gold per ton over 80 feet." Anyway, that was just great, and that was really a discovery.

That was a snowy year in Nevada. It was November of 1961. I remember we got the assays out of the trench, and then it snowed. And Bob Fulton came back out of New York at that time. He wanted to see what we found. When we went up on the mountain, there was about three or four feet of snow in the trench—it had drifted—so we had to get a shovel and dig it all out, so we could show him what the rocks were like, and so it could

be resampled, of course. But there were several storms that came across, and it really closed down our exploration program for that year—say, about the end of November. So, really, it was quite an eventful six months.

We didn't really know we were finding something as big as it turned out to be, but it was a successful program in the sense that you had John's original proposal, concept, and it was a disappointment that we couldn't make a deal on the Blue Star, but then again, what we learned from that led us to the Carlin area, the Carlin claims, and the discovery of something absolutely brand new, and that's where the season ended.

There were about six months that you were there until this closed down. Were you getting excited as you were going along?

Oh, yes. We worked seven days a week, pretty much, because there was lots to do. I took a vacation of about a couple weeks in the early part of September or October, but generally, we worked pretty steadily from June right through November, not necessarily all the time north of Carlin, because there were other prospects, other properties that either were sent to us from New York, or we'd go out and take a look at them one or two days, or some of the local people would want us to go check on their claims for them and see if they got a bonanza on their property. So there were all these things which really didn't interfere with our program, but filled the time that we had.

So, the local people were aware enough of what you were doing that they were also asking you to check out their property?

Some of the local people, yes. We didn't really broadcast our presence very much, but you can't live there for six months without people asking questions and figuring things out for themselves. People aren't dumb.

Especially not with the gold mining background there. And so, your days would be getting up, going out, collecting samples, and then taking them to Harry a couple times a week, getting the assays done.

Yes, we did mapping and sampling. You do the mapping first, and then find out from the mapping where the critical samples might be, and you check them out. These are the samples we took down to Harry Treweek. Most of the results come back low, of course, but every once in awhile you get a kick, and when it begins to make sense geologically, where the gold values are, then that's when the excitement builds.

And that was starting to happen towards the end of this. You were starting to get the pattern?

Well, at 80 feet of .20, that was great. That's fantastic. But as I said, the snows came in, and it kind of stopped our program at that time, in November of 1961.

You shut it down at that point, but you'd already staked the claims?

We had some claims, yes, I think, about seventeen claims. At the stage we were at in November of 1961, there were three of us there, because there was John and myself, and then Mort White joined us. Mort was a surveyor at that time. He helped us put in the claims and also helped to survey in the trenches, like exactly where they were and things like that.

Pete Loncar was working in Alaska that summer. After the end of that year, John Livermore got a promotion, went up to Canada to Toronto, and was exploration manager for the Canadian operations, coast to coast. Mort White and I were sent down to Pioche after the new year. We had a little bit of time to go home. I went to Spokane;

Mort lived at Grand Junction at that time. Come first week of the new year, we were in Pioche and started on a program at Bristol Silver Mines. This was 1962.

Byron Hardie was the manager of the Bristol Silver Mine. Mort and I and Byron, too, were involved in a program prospecting around that mine. So we stayed in Pioche until about April, and then Newmont asked me to go back to Carlin and start the program up again. We were going to do some more bulldozer trenching and put in some roads for drill sites and things like that. The thing was going to grow. We were back again at Carlin. The drill was coming in, and that was Pete Loncar's department. Pete was still living up in Spokane. He'd finished up whatever he'd had to do with the Alaska exploration at that time. Bob Fulton brought him down to Carlin in, say, the spring of 1962, to look after the drilling program, and by that time we had put in some drill sites and drill roads and things like that.

When Bob Fulton came out in November, what was his reaction to what you were finding?

Well, he was very pleased. He knew all the results, because he'd seen our sketches and things like that. He just wanted to see the rocks. And since we were there, we resampled things for reassay. That's a practice you follow, because there's always something that might happen between the sampling and the assay lab that could give you a spurious result. So, you check your results as closely as you can, all the time. We were able to resample and show him exactly where we'd sampled before, and he was able to take some rocks back to New York—because that's where he was based at that time—and show the people around the office what this new mineralization looked like. That was part of his job. He was very good at following the details of what we were doing and was very interested in it.



Byron Hardie.

Yes, and Pete mentioned that Bob Fulton was really very supportive of this whole project, that he was very sure that this was going to be something worthwhile.

Yes. There were two people we were reporting to, at least, John Livermore and I. For the six months from June, say, through to December in 1961, the person we saw the most of out of New York was Fred Searls. Bob Fulton had come out, too, but Fred Searls probably visited us four or five times; Bob Fulton, two or three. After the turn of the year, into 1962, Bob Fulton more or less took over, and we saw Fred Searls every once in awhile, but less frequently.

Bob Fulton became the number one manager of the program out of New York, and he was keen. Bob Fulton had Nevada roots. I think he was born in Nevada City, California, just over the line from Reno, and his father was one of the principals at the

Mackay School of Mines. His grandfather was prominent in the Reno area for some reason or other. I forget the details. So, there's quite a history of contribution to Nevada in that family.

Bob Fulton stayed with Newmont until 1972, I think. I was up in Canada at the time. He joined the company, McIntyre Porcupine Mines, which was Toronto based, and he worked for them about four or five years, and then he died. He had a cancer problem. So his career was kind of snuffed out early, but as Pete says, he was very energetic, and sometimes he was a tough person to work for, because time didn't matter. Like, if he arrived at eight o'clock at night, he expected you to be there and tell him what was going on. Since I was single it was no chore. When you are dealing with married people, perhaps, when Bob Fulton was coming out, you prepared for everything.

Yes, that's what he said. By today's standards he would have been considered a workaholic. He just worked all the time, and he expected his people to do the same.

Oh, yes. Very much so. Another thing I remember about Bob Fulton: he absolutely . . . well, worshiped is probably a strong word, but he worshiped Fred Searls. He thought Fred Searls was a pioneer in the mining industry and a great mentor. I'd endorse that a hundred percent, although the time I knew Fred Searls, he was in his seventies, and his mind was still working, but he wasn't quick on his feet physically, so to speak. His enthusiasm for gold is just the prospector instinct working there, even though he was an executive of a mining company. Bob Fulton really admired him. I remember going into Bob's office when he was with McIntyre in Toronto, and there on the wall was a picture of Fred Searls. So they really did get along together, those two, because Pete was aware of all that, too. He probably told you about it. So anyway, there was Bob Fulton.

Fred Searls died, oh, in the late 1960s, so that was a loss for Newmont. He was retired, was kind of an emeritus director, probably, at that time. But it was a loss, because, you know, you could sit and talk to Fred Searls and learn and learn and learn and learn from the stories that he was able to tell you about different properties and prospects and the history of the development of Newmont. It was really in 1962 that Bob Fulton took charge of the Carlin project, and he was in charge of it, to a large degree, right through to production, at least the geological end of it. There were other people who got involved from New York putting in the mill, deciding the metallurgy, and so on, but Bob Fulton managed the development to a large degree.

And you stayed on, then, through 1962, so you were there for another year or so as the

roads were being cut and the drilling, working with Pete.

I left Nevada in 1963. We haven't really talked about 1962 yet. We came back in April, 1962, and actually brought up the same bulldozer operator that we were using down in Pioche. He didn't have another job, and so we brought him up. His name was Jim Frazier, but I forget the name of his company. I think he lived in Ely, but I'm not so sure about that. He did very well, because in 1962, when we started bulldozing roads and drill sites, again, we were creating exposures and rocks that we could sample, and quite a few of these exposures had significant gold values in them. Essentially, I don't think that bulldozer left the property for several years. Jim had work for months and months—years—and did very well, because he was under contract per hour. At least, that's the kind of deal I worked with him, costs per hour. Whether or not he made another deal with Newmont on another basis later on, I don't know, but, essentially, he was employed full time, so he did very well.

The bulldozer was being used to make the roads and to set it up for the drill holes, is that correct?

Yes. You can understand how you use a bulldozer to make a road, and when you come to a drill site, you need an area cleared around where the hole's going to go down, so that they can put their drill on to begin with, which is usually on wheels of some kind. And then, people want to drive up in pickups; then they've got to have room to store their drill rods and, probably, have some sort of a tent or a covering, just in case the weather gets bad. So you need quite a bit of space around there to store things and be able to work.

And a flat space, because you're working on sides of hills and so on.

That's right, and just level it off. It didn't have to be absolutely flat, because you can jack up the rig, but as flat as you can get it. We had several sites that, based on the 1961 geological maps and so on, we thought we should drill, so we set those in, and then, he put in the drill sites and the roads.

There was another development at that time. You know, throughout Nevada, over the years, various homesteaders were given chunks of property, so that they could either farm it or ranch it or whatever, and there was a property there we called the Popovich Eighty Acres. In fact, we had staked up right against it. There was a cabin there and a spring, which was important—water. The TS Ranch cattle used to come and get their water there, some of these huge Hereford bulls, which didn't threaten us at all, but they were intimidating. They used to come and get their water there. While Mort and I were down at Pioche, and before we came back the following April, MM&S made a deal with the Popovich widow on the eighty acres. Mr. Popovich had died previously. John and I, while we were mapping our claims—because we mapped the eighty acres, too—recognized some of the potential. So we made a deal on the eighty acres. Bob Morris, who lived in Elko, was one of the M's of MM&S. He came up to me when we came back, and he said, "I've got this property."

I thought, "Well, Newmont should get that." So I recommended it to Bob Fulton. Bob Fulton came out and talked to Bob Morris, and I was there. It was the first negotiation on a property that I was actively involved with. They fleshed out the terms of a deal. I was kind of intermediary between New York and Bob Morris to get the deal to express the terms that were agreed to, because it was written by a lawyer. We had to make one or two little changes to make it right. We signed off that deal, and we had the eighty acres, so we were already increasing our property. At the same time, as I told you, we got seventeen claims. When we

started getting active there, we thought we better have some more claim protection, so we added to our claims, and not only adjacent to the group of seventeen, but some of the other adjacent patchwork properties that we could stake at that time. That continued into the summer.

You were doing the drilling and expanding the exploration, plus expanding the claims, and insuring that you had the property?

We contracted people to stake the claims, and there was almost some paranoia here, because the excitement was beginning to grow, and the activity was beginning to grow, and we were going to be the source of attention, even if we weren't yet. So, all this was done very quietly. The people who staked the claims were not supposed to tell anybody what they were doing.

Were you able to keep it fairly quiet still?

Fairly quiet, yes.

You were able to maintain the secrecy, even though you were using more and more workers. Were these local people that you were hiring?

Well, no. We'd bring in the contractors from outside, but it was becoming increasingly difficult to keep it quiet because of all these strange faces appearing in a town like Carlin, which has a population of only a few hundred. But you can imagine the excitement was beginning to build, and there were lots of things happening, because Pete was getting very much involved in a lot of this, too, not only the drillers that he was supervising. He was, to some degree, supervising the claim staking, as well, and I was busy there with the geology, primarily.

Were you getting excited?

Oh, yes.

Did you have any idea what the magnitude of this was?

No, not at all. Things were happening the way they should. You know, it doesn't happen very often. But you start from a proposal to develop a geologic concept. Like from Blue Star to Carlin, we were able to extend a geological model that we developed and find more gold, and then, suddenly, there was more and more and more gold, you see, because we were finding more things to sample and understanding the geology better.

The theories were proving out. This is the way it's supposed to work.

Things were clicking. So then, we were staking claims. We got the eighty acres.

You said that was the first time that you were actively involved in negotiating property. Did you like that?

I enjoyed it, because later on, especially up in Canada, I probably negotiated dozens, maybe a hundred agreements over twenty years.

Is there anything, particularly, that you learned from that negotiation?

Well, there was something that I carried with me in my career, and a certain degree of success came with it. I was working there with Bob Morris, who was essentially like a prospector negotiating an agreement. And with a major company coming in, it's quite often that the vendors—the people who own the property—are shut out. "Thanks, we got your property. Let's look at it. We'll tell you what we find." That's the attitude of a lot of companies, but I didn't work that way. Bob Morris and I would see each other several times a week because, remember, they were

still at the Blue Star. I'd just let him know, without giving him, necessarily, any critical details, what we were doing, and he was happy. Nice to know that the property was being worked on, and we were going about it in a professional manner. I carried that relationship to all the people I met in Canada.

Because that worked better than just leaving the owner out?

Yes, right, bringing in a lawyer and making it more impersonal. So, in Canada we used to do it that way, and I think, probably, when the competition was there between Newmont and Noranda and other companies like that, we had an edge, because your reputation would be out ahead of you. If Alan Coope said, "Well, we'll let you come on the property and see what we're doing," why, they knew very well that they'd be able to do that. So, I guess I learned that, although I didn't really appreciate it at the time. It was just the way things were going.

We still had the Maggie Creek property, which we were interested in. We also did some bulldozer trenching there and did some drilling on that property, more or less concurrent with the work we were doing further north at Carlin, because that consumed quite a bit of time during that late spring, early summer part of 1962.

One of the features of the Popovich deal was that there were some payments which were required at certain dates, and there was a fairly substantial payment that was due in the fall. It would be almost six months after we made the deal in April. If the property was worth the price, we'd make that payment, but in order to decide if the property was worth the price, we had to do some work on it. When the drill came up to Carlin, after the work we had been doing at Maggie Creek, we put it on the eighty acres first, so that we'd get the information in time to make a decision before the payment was due. Of

course, that meant I spent quite a bit of time on the eighty acres filling in the details and plotting the drill holes and things like that.

There was a significant event that I recollect from that detailed mapping. We'd been focusing primarily on what you might call obvious features of mineralization like iron staining, silicification, things like that. There was actually a fault plane. It was exposed, but you could see where rocks on either side of this plane had been moving, slickensides exposed right on the southern boundary of the eighty acres and the adjacent property. This fault zone was nicely iron stained. We sampled it several times. We always got the same kind of assay, which was about .07-.08 ounces per ton. On this particular day, it was coming up to lunch time, and I was right there in the same area again, getting ready to brown-bag my lunch there. I thought, well, before I sit down to lunch I'll sample this fault plane again, just to see if there was something we might have missed. So, I looked it over and sampled an area that we hadn't sampled before and perhaps looked a little different. I sat down on the edge of the outcrop with my feet hanging down and ate my lunch. I was all by myself, so I had no one to talk to.

Just after I'd had lunch and was putting the orange peel and the paper wraps together in the bag so I could take them back to the pickup, I noticed that some of the rocks around me weren't iron stained. They weren't silicified, but they were grayish. They were bleached, but they were porous, and I thought, "Oh gee, wouldn't it be nice if the porous rock could soak up some mineralizing fluids?"—a passing thought. So I get some of these pieces, and it was just float like loose rock on the surface, right where I was sitting. I put them in a bag, and, of course, they got the next number tag after the sample of the slickensided surface that I sampled just before lunch.

Well, when the results came back—couple of days, 3 days—.07 again for the

slickensided rock, but the relatively uninteresting rock, the porous rock, came back .22. Wow! So some of the rocks that we were perhaps overlooking and not sampling so carefully, could carry gold. I went back there and sampled some more of that float and kept getting more and more gold values in this bleached rock. The rock was altered, and nowadays, any geologist who'd been on the Trend would recognize it right away as being bleached, but at that time that wasn't really our prime focus, as far as alteration was concerned. There's more iron-stained rock and silicified rock—silicification.

If you like, a little bit of serendipity slipping in here. Anyway, it indicated to me and all of us, of course, that we could do a much better sampling job. So after that, I was involved in sampling float, rather than just sampling outcrops or new outcrops exposed by the bulldozers. I went through all these areas and collected representative amounts of broken rock on the surface, right in the sagebrush roots, if you like, and did it on a grid. All of a sudden we started getting some really outstanding values, values up to two ounces per ton in some of these places, and then we were really able to put together some structural direction on what turned out to be the ore body. We could drill contours on the assay. We didn't really do it that way, but we could outline the general sense—oh, the gold is in this area—which gave it a little bit more focus.

Certainly, that was a breakthrough. We began to appreciate that we should do a lot more sampling here and pay attention to this bleaching, which now is very significant, but at that time we didn't put a lot of importance on it. After that we certainly did, because it became a feature. So we were able to outline very broadly the mineralized zone from the float sampling, and, of course, that also affected the way we set up our drilling programs, but, fortunately for us, we got to that stage before we started doing the extensive drilling program, which extended off the

Popovich Eighty Acres onto the claims that we had staked earlier.

We sampled the float on the surface, just like picking rocks up off the ground—little pebbles, fist size or even smaller—putting them in a bag. That came from this area, and you had a grid set up, and that was sent in for assay. We didn't dig the soil or break into the rocks. That much more quickly outlined the zone. Now, we should go back to that .22 assay. It turned out to be very close to the property boundary on the Popovich Eighty Acres, actually, adjacent to TS land on the south, which we didn't control at that time. We had permission from the TS Ranch to cross the property, like drive our trucks across their roads, but we couldn't prospect on there, that is, drill and make bulldozer trenches. We also had this payment that was due in the latter part of 1962.

I remember when Bob Fulton came out the next time, I took him to the place where I'd had lunch and told him the whole story—similar to what I've just told you. He told me at that time, "Well, in order to meet that payment deadline we should have some drill sites." So, that's where I put the number one hole, right where I got that .22 assay, and then down the hill and up the hill, parallel to the property boundary, we put in several more sites. I think there were 11 all together, and that would be over a distance of a quarter of a mile, half a mile.

We started drilling on the eighty acres on the row of holes, and to do things efficiently, I extended one row of holes down the hill and down to the bottom near the creek. This was the water coming out of the spring. We drilled that one first, because it was easier to bring the drill into that one, and then we moved that thing, gradually, to drill the other holes over a period of time—took a few weeks. We got to the hole where I collected that sample and drilled it, and we got into some very fine-grained rock. It came up out of the hole—a lot of dust. You usually

get some dust, but this was a lot of dust. The sample was just like clay when it went into the bag. It wasn't cracked, hard pieces of rock; it was quite clay.

When the assays came back on that, they were certainly outstanding. We got almost a 100 feet of 1 ounce over the length of the hole. That was another significant discovery. The first discovery in my mind was the trench sample where we got 80 feet of .20, before the snow came, and then, this drill hole, which was in September that year, a 100 feet of \$36, which worked out at \$35 an ounce, about 1.05 ounces per ton, over 100 feet.

The drills didn't leave the property for years after that. There was a big rush to do more drilling. First of all, do we believe what we got? We drilled another hole five feet away, and even though the assays across the holes didn't match exactly, we still got an ounce of gold from that hole, so we completed the other drilling.

There was a rush to make a deal with the TS Ranch—because we were only about fifty feet away from their property boundary—to tie up the mineral rights on that, and Bob Fulton was involved in that. It was even more of a challenge for him, because the TS Ranch was owned by Litton Industries. They were based out of Los Angeles. Now they're big in the electronics industry. At that time, they had a mining arm. They weren't active in Nevada, but they were active in other parts of the country and parts of the world. It turned out that we were trying to negotiate mineral rights away from, really, a mining company.

Anyway, Bob Fulton was able to get a deal, so our program was able to expand, so what we really drilled into there was the eastern part of what turned out to be the Carlin ore body. As we extended the drilling later on that year, through this zone that we'd outlined from the float sampling and from the directions we'd interpret from the

geology (because they just kept drilling and drilling), we were getting into sections and able to confine this thing.

They sent me off then. Newmont had a project in Puerto Rico about that time, and Bob Fulton wanted me to go down to Puerto Rico, so I left just about that time, soon after those initial results had come out. I left in October. That was the time of the Cuban crisis when Krushchev was shipping missiles into Cuba, and the day before I flew into San Juan, Puerto Rico, Krushchev agreed to pull out the missiles. You know, it was Kennedy and Krushchev. As we flew into San Juan, there was the U.S. fleet. We flew right over it, and that really sent a chill down your spine, to see all that power. That was 1962—about the same time that John Glenn went up in the satellite. It all happened in that part of the year.

So, anyway, I went down to Puerto Rico and stayed there for the rest of the year. Pete Loncar was running the drilling, and I really don't know who was doing geology at that time, if anyone.

Pete said that there was no one there at that time, that there was about a year before Byron came in.

Byron came in 1963; we'll get to that in a minute.

Was there no need for a geologist at that point? Had you mapped things out enough that they just needed to do the follow-up drilling?

It was a pretty straight-forward drilling program, and the sampling was straight forward, because what they did was drill for five feet and take that material, and, actually, you split it. You get a large volume of material, split it down until you can put a sample into a bag. Some of those were quite large, five to ten kilograms of material. At

the same time, we'd collect a spare sample, which we'd store just in case something happened to the original one. Rejects we used to call those. There was a procedure every five feet of collecting these samples, and you put the sample tag in there and write the number on the bag, too. That would go off to the assayer. So we kept repeating that. But another thing that you can do as the rock comes out of the ground, no matter what form it's in, is that a geologist can identify it and look at it. We could still do that, because we had the reject material, but we didn't do it right at the same time.

So, it's true. I left, and there was no geologist on the program for about three or four months, probably, but the drilling continued. When I came back from Puerto Rico, I didn't go directly to Nevada; I went to New York. There Bob Fulton showed me some of the results we were getting. We were getting good assays from some of the other holes—this time on the original claims that we'd staked on the eighty acres. The decision had been made to go through with the deal on the eighty acres. In fact, I think they accelerated the deal. Newmont bought them out, and then we had the deal with the TS Ranch. We had our original seventeen claims, and that had been added to, because we had additional claims all around that were acquired, staked for us by the contractors.

So, by the time you came back, had most of the claim work and the negotiating been done for the property that Newmont needed?

Yes, the TS Ranch negotiation—Bob Fulton handled that, because he went down to Los Angeles to talk to them right off. The Popovich deal was sealed in the spring. It was just the matter of negotiating a price for their property, right then and there, and they agreed on it, and someone wrote a check, and that was it. It was ours. The other claims

that we staked by contract—we owned those anyway just through the mining act.

So, we had quite a big property there. There were still some islands of TS Ranch property that we didn't have, but there was some overall understanding between the two companies that, perhaps, we'd have the right of first refusal. That all came together by the end of 1962. We didn't have any competition, really, from any other mining companies at that time, but people were beginning to appreciate that there was something going on.

The secret was out by now, because of all the property deals and so on?

Yes. There was one article that came out fairly early, probably early 1962, and we think it might have been some of the prospectors in the region, but the article came out in the *Salt Lake Tribune* that there was activity out there. They quoted Mort White's name and my name, but they spelled it wrongly, you see. Coope they spelled "Kupe." Alan was spelled with two Ls and an E, and not like it is, and Mort White's name was spelled wrongly, too. So, they knew very well that we weren't the source of the rumor—like some mistake that we'd made, and the people who wrote up this story just didn't know us, except by word of mouth.

It created some interest, but not a lot. As things continued, of course, the cat was partly out of the bag because of that. As things continued, it became more and more apparent that Newmont was sticking around, and there was some reason for it, but it didn't really become a problem for us, as far as acquiring property and getting a satisfactory land position.

You mentioned that there was no other competition. None of the other companies were looking at that property or considering that?

The competition was growing now. The strongest competition at that time seemed to be coming from Kerr McGee. Kerr McGee was in the oil business, and they were interested in gold, and they were mainly working to the south of us. They were looking around, just immediately to the south of us. We knew that. And then a little later, the gold companies like Homestake came in, but we didn't see much of those. This would still be late 1962, early 1963, going into that period of time. But we didn't have a problem up around Carlin. The MM&S people staked more claims north of us, in fact. We knew what they were doing. We needed water if we were going to have an operation. Once you realize that you've got something, you've got to think about these things, even though you might need them years into the future. So we were looking for those possibilities. But Byron, when he came later, was more involved with that kind of thing.

I see. When you left to go to Puerto Rico, did you feel like your job there was done? Or did you feel like there was more work to do?

Oh, there was much more work to do. It was difficult to leave, but Puerto Rico was another challenge, and I knew very well that I'd be filled in on the results in Carlin. I think Bob Fulton indicated to me that he wanted me to go back to Nevada. I went to Puerto Rico, and I went home to England for Christmas and eventually got back to Nevada in January. They were still drilling. Pete had several drills, I think, at that time, and things were steaming along.

So, you went back to work with Pete?

For awhile. At that time, we started looking further afield. You know, if there's one like this, there's probably some more. We never forgot about the Gold Acres area, be-

cause we knew very well there was this kind of gold down there. Gold Acres—like London Extension—closed down in 1961. We're now in January of 1963, more or less. Harry Treweek was on the adjacent Gold Acres property, and, in addition to doing the assaying, part of his income came from looking after property that was owned by a lawyer back in Ohio, who had the Little Gold Acres. Eventually, we made a deal to look at the Little Gold Acres, because Harry Treweek brokered that deal. I was sent down there to map that, and I forget the exact timing, but it would be February or March. So, again, I lived down there, because it was a big commute going back and forth every day. I lived down there in Harry's house with Harry and Clemmie and mapped that area and set out a drilling program. I completed that about the end of April.

The end of April, beginning of May, I was sent up to Canada, but in that same interval Byron Hardie came on the scene, and I spent some time with Byron, more or less, walking over the Carlin area, showing him what I'd learned and what we'd seen, and describing the rocks to kind of bring him up to snuff. He took over the geology, say, May of 1963. At Gold Acres, Little Gold Acres, I recommended a drilling program, and things were really growing at that time.

There's another friend of mine, a Canadian, Bob Sheldon, who was coming back from a three-year stint in southwest Africa, a place called Tsumeb. He was coming back, and Bob Fulton brought him to Carlin or to Elko, and his job was calculating ore reserves, because there was a lot of drilling that had been done and a lot of assays. He had to calculate the ore reserves and keep them current. Bob was doing that, as well as some geological work on the core. Bob arrived just about the time I was leaving. In fact, he got off the plane, and I got on it.

I'd worked with Bob previously up in Alaska. He'd been away three years in south-

ern Africa, and that's the first time I'd seen him. We briefly said hello and goodbye there at the Elko airport, and I was on my way to Canada. Bob followed up with the drilling program on the Gold Acres property; he followed the program that I'd left behind. So when I left, there were more and more people coming in who were in specialized fields of various exploration and ore-reserve calculation, so really, we were beginning to hustle.

At that time Newmont had established an office in Elko. Their exploration office for the West, when we started all this, where the bills were paid and things like that, was in Montrose, Colorado. That's where Pete is now. That place was established during the uranium boom, which was in the 1950s, because Newmont was doing a lot of work in Utah and Colorado for uranium, and Pete was involved in that, too. Ironically, Newmont's uranium mine turned out to be up in Washington. That's where Pete went from Colorado and Utah, brought in an accountant and secretaries, things like that. It was right down in the same block as the Commercial Hotel there in Elko. So that's how things were really coming together. I think they established that office in Elko—I don't know if it was 1962 or early 1963, because everything was prepared before that, like the latter part of 1962. They'd made the deal to rent the space for the office and made arrangements to move people from Montrose to Elko. All that came into being in the early part of 1963. We finished the Gold Acres in April and spent some time with Byron, who had joined Newmont, and then I left in May.

Was that the last time that you actually worked there in the Carlin area?

Yes, I didn't get back to do any more work until the late 1980s. I moved up to Canada. I moved right up into the Yukon from Nevada, because it was break-up in the Yukon. The ice and snow were just thawing out at

that time. So I went from nice spring weather in Nevada into the break-up conditions in the Yukon. I took with me copies of materials and maps that I had made, because I still hadn't got a completed report, which I eventually sent back to Byron. It took me a couple of months to get all that together and send it back. When they got my report, of course, they were independent of me, so that was really when I phased out of the Carlin program.

But all the others were in there: Bob Sheldon, Bob Fulton, Pete Loncar. They started planning the mine and the mill and things like that. There was Paul Stucker and Frank McQuiston; they were metallurgists. They all got involved, and it was a big push to get it into production. The official opening was May of 1965. They like to get things running smoothly before they invite in the politicians and VIPs, see. So they'd be operating a few weeks before that opening, getting the bugs out of the system.

This was such a huge thing. The awareness of how big it was kind of came on you in different layers. Can you talk about that a little bit?

Well, in 1963 we knew we had something, and Carlin came into production. The second deposit to come into production, that I recall anyway, was at Cortez—the Cortez mine—which is quite a ways from Carlin but just across the valley from where I was working at Gold Acres, south. It's an interesting discovery; it involved the USGS geochemists and was announced in late 1966. It was a smaller deposit than Carlin. Carlin, by the time it came into production, was 10 million tons of .32. Cortez, I remember, was a similar grade, .32 at about 4 million tons, very similar geology—almost identical. It was as identical as you can get with ore deposits.

Cortez would come into production in the late 1960s. As Carlin became more ad-

vanced, Newmont started looking up and down the Tuscarora Range for deposits of the similar type. It wasn't really a full-blown program; it was some exploration. Some of the work was done in the 1970s. Perry West was involved with that. Byron hired Perry to do the same line of work, but the real push on gold came later than that. Newmont got much more aggressive about their exploration in the late 1970s, early 1980s, and that's when they started finding some of these other deposits around Blue Star. Newmont made a deal on Blue Star. They made a deal on the Bootstrap, eventually, so that we got those deposits tied up.

Those ones that you couldn't get early on when you were trying to?

That's right. But quite close to the Blue Star they started finding other deposits, other significant gold deposits, like Genesis, because it was in the mid-1980s that Barrick came on the scene with the Goldstrike up there. It was during the 1980s that the enormity of the Carlin Trend became apparent, and you're looking at millions and millions of ounces.

So that's when it was clear to you—the late 1980s? Did you have any sense of it before then?

Well, no, but at that time, I remember talking to many people and saying, "Well, there's got to be more of them. There's got to be more." This was before it became apparent where these deposits were aligned, you see. There must be more there. The early prospectors, the old-timers that went through in the mid-1800s, used the gold pan, and the gold pan is not the best tool for looking for those types of deposits. From what we learned from studying the geology and studying the mineralization, there was no reason there shouldn't be other deposits in that region, because we knew the geology

extended north and south and east and west, all over. There was evidence of mineralization. Like the Bootstrap and places beyond that, there was all kinds of mineral showings—nothing very big. These are the initial clues. It was just a matter of putting the pieces together and putting the story together and drilling in the right place. Newmont was there, and they were able to tie up quite large areas of the Carlin Trend. The details I don't recall, because I wasn't there, but some of the other people, like Byron and probably some of the people who are still with Newmont, still recall the acquisitions and the drillings at that time, but it did grow. The Carlin Trend is going to be the biggest gold producing district in North America, in terms of ounces. And before, that was up in Canada in what we call the Porcupine Belt—Timmins, Kirkland Lake—across northern Ontario, which was discovered in the 1920s or just before that.

What has it meant for you personally? You were there right at the beginning, and you were the one that picked up the float.

Well, that's right. I was there. I was part of the story. And you get a lot of pride and satisfaction out of that. We were doing our job. We got paid, and that was it, but the professional satisfaction coming out of that was just great. I was very fortunate, because I was still a young geologist, and as things would have it, I was sent to Carlin at that particular point in time. A lot of things came together before that, to put me on that path, if you'd like to describe it that way.

Some geologists might spend their whole life and not have that kind of a find.

That's right. Some very good ones, too. Very good geologists. You know, to be associated with a major mineral deposit is a coup. And there are more geologists than there are major mineral deposits.

So, there's some luck in there, too?

That's right. I always say you got to meet luck half way—and you do. You got to do your work, but, then again, there are certain happenings, which you don't anticipate, and you don't plan, which keep you on the straight and narrow.

Does it always feel a little bit like it belongs to you in some way—from that initial discovery? Does it feel special compared to some of the other projects you've worked on?

Well, you have a special connection with it, and also, you're interested in whatever happens, right? But it's not part of me right now, as such. It's part of my background, but it's not part of me right now.

I see from your resume, you've done lots of other things, and one of the things that we haven't talked about is this training that you had in geochemistry, which was a new thing. Tell me how that relates to the Carlin, that you had an opportunity there.

Well, it was probably about mid-1962, and Bob Fulton was out at Carlin. I said, "Well, since we know this thing outcropped, like we were getting values at surface, it should be a geochemical anomaly." I said, "Could I run some samples across it?"

And he said, "Yes." No hesitation. He said, "You fit it in."

Well, I didn't fit it in, but it was done in later years by other people who joined Newmont, and because there were striking anomalies, it would have been a coup for geochemistry if I had done that and was able to produce, say, a traverse with a nice anomaly. It wouldn't have been for gold, perhaps, but it would have been for the elements that are associated with the gold, like mercury, arsenic, and so on, more or less, right over the gold—the Carlin deposit. That

would have got into the literature, perhaps, and it would still be quoted as part of the geological courses in some of the universities, if this was the initial geochemical traverse of the Carlin deposit. Well, now there are hundreds, thousands of geochemical traverses over Carlin and also other deposits. There's no shortage of those.

It's not a new thing. But you've done a lot of work in that area, I see, from your publications and so on, on your resume. You've been very active in geochemistry.

Oh, yes. Well, that was my field. That was my speciality, you know. I had the geological training in those early years with Newmont. Except for the Philippines, I was a geologist. When I went up to Canada, I became a geochemist again. I was doing geochemistry in the Yukon, and, also, right across Canada over the years. I got more and more responsibility in Canada. I became a vice president, eventually, so I didn't spend so much time in the field, but true, geochemistry is my speciality. To be a good geochemist, you've got to be a geologist to begin with, but it's true, like on the earliest textbook on geochemistry, I was able to contribute to it. So I was in on the ground floor, if you like, in the early 1960s. That first textbook came out in 1962. I got a copy of that. I can show it to you.

So, you were working on that when you were working on the Carlin?

Well, no. I wasn't working on the book so much. The authors—one was John Webb, who taught me in London, and the other fellow was Herb Hawkes, who was an American. He worked from the USGS until the late 1950s, I think, and then he went to Berkeley. He was a prof at Berkeley, and then after that he became a consultant. It was while Herb Hawkes was at Berkeley, and I was in Nevada, and John Webb was still traveling,

doing his consulting, going to Australia and places like that. There were one or two times we all met in San Francisco to discuss the book, not that I was deeply involved in all phases of the book, but I was making various contributions, and they were included in the book. I think we did that three times, like meeting in San Francisco. When John Webb was flying back from Australia to Europe, he'd come through San Francisco, and Herb was right there, of course, and then I was in Nevada, and I had to request permission from Bob Fulton to go spend a weekend in San Francisco.

You got your training in London, and in a profession that requires you to travel all over the world, which you've done. You must have known early on that you were not going to be staying in London very much?

Oh, yes, that's true. When I was at the Royal School of Mines we used to go out and do summer jobs like students do, but rarely in Great Britain. South Africa, Canada, Scandinavia—Sweden mainly—and that was the shortest distance, of course, from London. One or two people went out to Australia, but it took a long time to get to Australia. There were no jets at that time, and plane trips took a few days, and, of course, ships used to take about six weeks to go to Capetown from London. When you went out with your family, if you got a job, that's the way you went.

It was generally understood in Royal School of Mines that if you took a summer job, it wouldn't be in England. Although, just before I started at Imperial College, there was a British company there interested in looking at some of the old mining camps in England, so I did spend part of a summer on the Isle of Man and also in western Scotland, doing geochemistry in old mining camps. These are camps that had probably been worked as far back as the Romans, two thou-

sand years. I got some experience there, and I was very much a student doing what I was told. That was really the only work that I did in the British Isles in those years. When I got involved with the research at Imperial College I was in Africa, and soon as that was finished I was in the Philippines. I haven't been back except for visits to England.

Does Tucson feel like home to you now?

It does now.

You've been all over the world.

The longest time in any one place that we spent was up in Toronto. I was there almost twenty-five years, but as a family we were there for seventeen before we were transferred from Toronto to Tucson. That was a good stretch. The people I used to work with in the mining industry—and Bob Sheldon was one of them—lived in something like nineteen different houses over twenty-five years. I didn't experience that.

Yes. But that first period of time that we talking about, when you were working on the Carlin Trend, you were in and out of there and back and forth.

I was living out of a suitcase, essentially. I had an apartment in Spokane, but sometimes I paid rent for months on end without being there. We were very mobile. You have to be very mobile.

Was there also a community of people that you worked with, that you've stayed in touch with, that is kind of your community no matter where you are?

Oh, yes, through the geochemistry, primarily. See, you're there at the beginning. You got to know all the people who were in there at the beginning, and also the people that came in later. So I can go to most places

which are exploration centers like Vancouver and Toronto, Perth, Sydney, Melbourne, and check in the hotel and pick up the phone and call somebody I know. We still know those people, because they're my contemporaries, a lot of them. They're retired or getting towards the end of their careers. And we organized geochemistry. We formed a society, Association of Exploration Geochemists. We meet every two years somewhere. The next meeting is next year in Vancouver. The one before that was in Jerusalem. I didn't go. The one before that was in Townsville in Queensland. I was there. You go back through time, and there's about twenty of these meetings that have been organized since about 1970, where geochemists get together and spend about a week listening and talking and so on. So that community has kept together.

How has that branch, geochemistry, grown since those pioneer days? Or changed?

Well, it's changed. It's not so much of a speciality nowadays, because all geologists, mining geologists, get some instruction in geochemistry in their university years. There's not the same demand for the geochemistry specialist as there used to be, because we sometimes grumble about that, because some of the quality of the geochemistry work could be better, when you look at it around the world. It hasn't really become the field that mining companies feel that they should develop speciality expertise in. Like I was able to go through my career as the only specialist. Newmont still has geochemists who are trained, but a lot of other companies don't have geochemists. They employ geologists who've got some experience with geochemistry. There are a lot of companies without geophysical groups, but geophysics is probably a little bit more difficult for the geological mind to understand, because they're thinking physics and math most of the time. You still do find spe-

cialist geophysicists. Some of them are consultants. One or two companies—and that's all, just one or two—have research geophysical groups—Newmont is one—but they haven't grown, like as the industry has grown, as you might have predicted some years ago. Some managers don't think they need it. Others are just controlling costs, and others employ consultants. There are several ways—you don't have to employ a geochemist twelve months in the year, if you only need him for three or four. You go for a consultant.

You would have expected that this field would have grown and expanded, because there were some cost savings, actually.

Well, it's still an important part of exploration. You go to the tropical countries, where a lot of exploration is going on now, like Indonesia, Southeast Asia, Africa, and South American countries—virtually all those exploration programs involve geochemistry, and it's an important part, but it's not always run by geochemists. Similarly, they do a lot of geophysics. Well, all that geophysics is contracted, and not every company employs full-time geophysicists and geochemists. It's cost cutting, cost control. I still think it might change. You know, I'm still a student of geochemistry, if you like. And several of the things that I've observed, and others have, too, is that a lot of the patterns that we get when we do our geochemical sampling are not readily explained by the theories that we work with and the experience that's gone before. There's something out there we don't understand, and I think this is going to be quite a breakthrough soon.

How that will affect the field of geochemistry, I don't know, because there are only a handful of people who are really interested in it and are on the point of developing techniques which will find deposits under hundreds of feet of cover. Some company is

advertising techniques they can use to find buried deposits, but the techniques work in some areas and not in others. See, what we've been missing is an understanding of the process that's creating this dispersion that we can measure. It will vary from one environment—say, an environment of pediment gravels that you've got in the Nevada valleys—to probably some other type of cover that you've got in Mexico or South America or somewhere else like Australia. So there will actually be a common process, and it will behave differently in each of these environments.

If you understand the process, then you can adapt your prospecting technique to detect it. People who advertise these techniques right now as seeing buried deposits are not there yet. You know, they haven't risen to that level, but even though I haven't been doing research, I know people who have done research on this process, and they're beginning to explain it. There's no doubt that it's happening, because you can measure it, but how it got there, we're not quite sure. We're on the verge of it, I think. So this is progress.

Beyond that, when this becomes common knowledge, and we find a whole lot of new deposits—perhaps because of it—there'll be another technological breakthrough or scientific advance. It's an understanding of the Earth. We don't really understand the Earth yet. Probably, only 15 percent of all we should know about the Earth is taught in the universities and understood by people who spend their lives studying these. We've got a long way to go. There'll always be that scientific challenge out there, way into the next century and beyond, and there's some amazing things that we're going to find.

I have a sense, as you talk, that at every step along the way in your career you've kind of been on the edge of things changing.

Well, I've tried to be, but, you know, when you were with Newmont, you could use their communication links and so on. It was much easier to stay up on these things, because as you traveled for Newmont there was always the opportunity to stop by and see so-and-so in Perth and find out what they'd been doing, and then go on to Sydney and stop by and talk to so-and-so. I don't have that opportunity anymore, at least not so frequently. I used to be able to do that once every year or so, and now I can't, but somebody's doing it. You know, somebody should be doing it, and with communication as it is today, like with e-mail, I could talk to Perth and get an answer tomorrow. See, it's very easy, although you don't see the things. You could talk about it. So, it's still going on, but the way it's done changes. You get a technological advance, and you understand it. It could be technological; it could be scientific. And then that technique is used. As a result of that you probably find a rush of discoveries, because of the application of new ideas. You can't really predict what it might be. If gold is attractive, there might be a rush of gold discoveries, or if base metals, there'll be a rush of base metals. Then again, it quiets down until minds begin to work and figure out, well, there's something else we can use here, a new scientific breakthrough, technological breakthrough, and then it goes up to the next level.

That's really what happened with the Carlin Trend then, because it started back with some of those early publications in the 1930s—the Vanderburg report and so on, on micron-size gold. Then it was kind of put on hold for the war and the years after, and then in the 1960s—1959, 1960, 1961—that's when Newmont came.

That's right, and we got into it. Thirty-five-dollar gold—not many people were looking for gold at thirty-five dollars. Well, the idea was that there's gold out there that

people haven't really been looking for, and that's John Livermore's push, talking to people like Fred Searls, who was really brought up during the gold rushes in California and Nevada, and Bob Fulton, who was born in that part of the world. So all these people had gold in their blood, and that's true with a lot of people who've prospected for gold in the past. You never, never lose interest in gold. There's always, probably, another find to make, and if it's high grade, you'll make money anytime. You see you can make a profit out of it, so you become a gold bug, and you're a gold bug for life. You had that background in Newmont. That's the only way I can explain it—why Newmont would get into the gold business, when really it wasn't financially and economically attractive.

You have the concept of invisible gold, which was real, and then you had the people who had got the gold bug from previous years. There was also the thing, which I've talked about before in here—Newmont in the war years was into base metals, because most people were into porphyry coppers, and the porphyry copper industry had developed much earlier, but it became a real target for explorationists, say, in the 1950s and 1960s. Newmont was in that business, and what you see in the porphyry copper industry was the development of open pits. The new technology in the form of big shovels and trucks and things like that had also improved metallurgical technology. You could mine lower grades and make money at it, because you move more tons of ore at a lower cost. The grade of the metal contained didn't have to be quite so high. I remember talking to Bob Fulton about this, and I'm sure that Plato Malozemoff understood that, and Fred Searls understood it, too.

So really, when we were looking for Carlin, we were looking for something near surface, which you could dig out with the shovel and trucks and things like that, which we found. Carlin was sitting right there. Easy metallurgy. So it means that it's easy to get

the gold out of the rock, once you've mined it. Carlin was like that, because it was oxidized, because it was close to the surface, and the simple cyanide leach took out the gold quite easily.

So you have cheap mining. You had cheap metallurgy and made money at \$35. In fact, .32 gold at \$35 is roughly about \$10.50. Now, that's the value of a ton of rock in the ground. Newmont, using the cheaper mining and keeping cheaper metallurgical techniques, was able to produce gold for about \$4 or \$5 a ton. So, the profit was \$5 or a little bit better on each ton they mined, and they were mining 2,000-2,500 tons a day. They paid a dividend after 8 months at Carlin. That was at \$35 gold. If we'd have found a Carlin deposit that had a grade of .10, we probably wouldn't have mined it. So we were lucky there.

We didn't put the gold in the ground. If the gold hadn't been there, we wouldn't have been able to start Carlin up. In fact, at that Gold Acres property, which we did eventually drill, we came up with an initial estimate of about 1.1 million tons of .10 ounce per ton. Newmont dropped it. It wasn't an ore body. Soon after, Cortez was found across the valley, and they found enough grade to put in a mill, and so they were able to mine some of that eventually at Gold Acres, truck it across the valley, and use that mill, and then it became economic.



I'd like to ask you a little bit more about your background and experience. I'm curious to know where you learned the survival skills needed in the field when you're out prospecting or exploring.

Survival skills—that's an interesting term. You know, when my career began in the 1950s, you didn't have the same efficient transportation means that you have now. Helicopters were just beginning at that time,

and vehicles—trucks and things—weren't quite so reliable, so you had to plan ahead. Looking back on my experience, the first time going out into Africa, where I did my thesis field work, communications there were less well-developed than they were in Europe and North America at that time, so you went prepared. Fortunately for me, I was working with people who lived in that environment and taught me, essentially, how to order my groceries, how to stash fuel, things like this, which you had to do in advance of these programs.

We used to plan carefully ahead, taking days to do that, to make sure that eventualities like crises, if you like, could be covered: first aid, food, fuel, and communication. We didn't have radios, but we had to have reliable transportation from the field, so we could get to the nearest telephone, which might be a long way away. With that kind of background, you'd plan these things, and it seemed so natural to do it that I didn't have any problem learning how to do it in those days. When we went out in the bush in Botswana, for example, we knew very well that we didn't have to come back into town for two weeks, and then, usually, just for groceries. So when we were in the field, I had a local fellow with me. He was a white man, Afrikaner, and he had his rifle and his license, and we shot usually an animal once a week to give us fresh meat. That was the norm in Africa when I was there. There were special licenses available for people who lived in the bush, so that they could shoot animals in sufficient quantity just to sustain themselves.

Usually we had antelopes—impala, mainly—in Botswana. Sometimes larger animals, like a kudu. A kudu is the size of a cow. Unless you had a large number of Africans working with you, it would be difficult to consume that before it went bad. No refrigerator or anything like that—just hang the meat up in the tree. It would dry on the outside, and, hopefully, the insects or the

ants or something like that wouldn't eat it before you did, but we were quite sensible about these things. If we were going to go somewhere and be away, and the meat supply was short, we wouldn't go and shoot a big animal; we'd shoot a small one, if we could find one.

We supplemented the meat with canned goods, a lot of dry goods. Climate there was pretty dry. Soups and vegetables—we got that. In Tanganyika we actually employed an African to go and get fresh vegetables, which was about a day's walk from the camp. To those Africans, a day's walk was nothing. It was a cushy job. We used to pay them the same rate as the others. They'd set out one day, walk, and usually they walked continuously, into the night hours, in darkness. They'd spend the day at the farm area where the vegetables are grown, pack them up, and then the next day they'd come back. So it was a three-day cycle, and they did it twice a week. They always went and came back, went and came back. Quite often in Africa you give fellows some money, and that's the last you're going to see of them, but you'd give these fellows some money to pay for the vegetables, and they were good, because they got their pay on top of that.

So it was worth coming back?

Yes.

So, you learned early on to plan ahead for the whole thing.

Well, I guess you've got to like to be out there. I liked it. To some degree it was all new to me, because they're all new environments. Going out to Africa was like going back into your old geography lessons in junior school and saying, "Gee, it would be nice to go out there and witness that, see the mountains, see the people, see the animals, and so on." So it was all delivered to me on a silver platter. I was doing what I wanted to

do in environments which absolutely intrigued me, so I was learning all the time. I was thrilled. I used to read a lot of stories about these countries—almost romance about the way people existed at that time. So I was aware it was a different environment. I wasn't cocky in the sense that I felt that I could overcome these. I took all the advice that was offered, and I'm pleased I did.

And you had a chance to study from people who'd been out there before and had plenty of experience about the eventualities then.

Yes, and to a large degree working with those people at the same time. The Afrikaner fellow who was with me was in his forties, I would say, but he spent most of his time in the bush, and he was very good. He knew his way around and taught me a lot of things. I was out there in Botswana for about a month, stayed there three months altogether in the field. After a month I hit my wrist against a tree and my watch was broken. I had relied on that watch during the day, so that I'd come back to camp on time, and so forth. The Africans didn't have watches. Well, they didn't need them, because when my watch was in pieces, they taught me to tell time by the sun, which is relatively easy to do, but it's not something that we do naturally. So I could tell the time within fifteen minutes after they'd instructed me how to align myself and get the sun in my sights, because the sun was always there, which was useful. So you become a little bit native, shall we say, but when you do that you become a little bit less concerned about the Hollywood-type stories that came out of Africa, because it's not like that.

It's not like that at all. Was Africa a good training ground for you for some of the places you went later?

I thought so. Not that I went into environments that were similar, like in Botswana, in Bechuanaland. That was desert. I've worked a lot in deserts. You carry water, and you think about water; if you want to go somewhere, and you don't have enough water, you don't go. You rearrange your time. So, those kinds of things I learned. The Africans, even though they couldn't stop me, because they worked for me, they would always speak up and say, "No bwana," and all this, "not the thing to do." I learned to respect that. They were saying it for good reason. These things kind of grow in your conscience and become part of your own sense of organization and planning. You mature.

Compare your arrival in Carlin to some of your previous experience, like Africa, the Philippines, Alaska. What were the similarities or differences?

Well, the difference, mainly, is that in Nevada we had our four-wheel-drive vehicles. Not that we didn't have four-wheel-drive vehicles before, but in Nevada you could go almost everywhere you wanted with that vehicle. You could climb up the hills off the road and go great distances.

So you didn't have to do a lot of hiking?

Well, we saved a lot of time with those vehicles, but when we got to where we wanted to go—probably this is something I learned from John Livermore and was emphasized by him—we got out of that pickup, and we hiked around and broke the rocks. That's kind of critical, because you don't see as much when you're sitting in a pickup. You see less when you're sitting in a helicopter, and there's a human tendency to spend more time in the helicopter and the pickup than on the ground, among a lot of people. You do better work when you're hiking on the hills; you become prospectors.

When you talk to John Livermore, I'm sure he'll emphasize it. John was given an award by the SME [Society for Mining, Metallurgy and Exploration, Inc.] a few years ago in Phoenix. The award came with a requirement for the recipient to give a talk. John doesn't like to give talks, but in order to get this award he gave a talk. One of the comments he made—and this is talking 1990s—was, "There are lots of very good geologists today working for mining companies, but not many of those geologists are good prospectors." I think that summarizes his philosophy about doing field work, and I think he's 100 percent correct. Simple as that.

It really takes being out there and taking the time to look around.

Part of my experience is being a geochemist, like when I'm on a program doing geochemistry and not spending a lot of time observing the geology, because I have other geochemical things to do, but when the time comes for me to interpret the geochemistry and, to some degree, right at the beginning of the program, planning the program, if I don't have the geologic input—the geologic observations—I can't do as good a job, because I need that information to interpret. I need that information to plan a program. If the geologist is not giving me that information, and I don't have the same opportunity to collect the geological information myself, I'm conscious of not doing such a good job. So, independently, I kind of build a philosophy.

Geochemistry is a specialization; geophysics is a specialization. There's a lot of technology involved with those, which is all very good, if you can integrate that with the geology, which is your all-important reference when you're doing mineral exploration. I believe that programs that to a large degree are solely directed by technology or specialization, with less emphasis on geol-

ogy, are doomed to failure. Now, they're probably doomed to failure 97 percent of the time, because every once in awhile they make a hit, but I think the secret to good mineral exploration is a solid geological understanding, careful geological recording, and interpretation using competent people who are prospectors in addition to being well-trained and informed geologists. They provide a fundamental database for the interpretation of these special technologies, whether it's geochemistry, geophysics, or whatever. There are lots of them these days that are available through the expanding technologies. I think that's fundamental.

If you find an exploration program, which is heavily weighted technologically, I'm prepared to guarantee it won't be as successful as the one that's heavily weighted geologically. So that's the philosophy that has grown with me. I still believe that strongly, and I think a lot of the fundamental understanding and development of that started forty years ago when I was kicking rocks with John Livermore.

Let's talk a little bit more about kicking rocks. Can you give me a detailed description of how you went about the whole exploration—the mapping, the sampling, how you set up that project?

Well, the Carlin is the best one to describe to you, because it's pertinent, and it is a good example. I described to you that work we did on the Blue Star, right? When we didn't make a deal on that property, we were kind of free to wander the hills in the Tuscarora Range there and look for something similar to what we'd been investigating. Initially, we were able to follow the geology quite easily. Nevada is fine. On the ridges, anyway, you get thin soils. The rock fragments are scattered in the soil, and there are quite a few outcrops, too, so you can more or less walk the geology, especially if the geology is distinctive. The shales and

cherts of the upper plate are a different color and different look from the limestones and quartzites of the lower plate. So, where those rocks came together on the Roberts Mountains Thrust, you can almost walk along it.

Can you describe for me one more time, just briefly, what came from the east, and what came from the west? Did the west come over the top of the east?

Yes, the east, more or less, stayed where it was. The shale and the cherts came from the west.

OK, and the limestone and quartzite was underneath, and that's from the east.

That's right. When you get pressure and compression, the crust shortens, see, and when the crust shortens you get these thrust structures that develop. So, a simple explanation, that's what's happening. The crust was shortening.

Then, it took the erosion to get down to the limestone and quartzite.

Develop the windows—Ralph Roberts's windows.

So, you could see this, and it was easy to walk along.

That's right. We did that, and we walked in several directions, because it's not simple. It's not just like walking along a straight line, because the topography and the structure will make contacts move on the surface. If you had a straight contact like that, and it's faulted, this part comes down here, so really you can walk along there, and suddenly there's a change. It's not the same. So you have to wander around and find the offset to the fault. If it's dipping like this, as you go along the ridge, its direction will change. If it's vertical, it will go straight. If it's dipping

at an angle like that, according to topography, the direction will change. Rocks over time will roll down the hill, so where you find some rocks, they probably didn't originate directly below where you find them. They rolled down the hill. So you have to figure all these things out. It's not just like walking along a pathway. You're walking along this contact, which your progress one day might be a quarter of a mile, and next day it might be, say, a couple of miles—according to the complexities.

When you were walking, did you and John go together, or did you split up?

We usually were within shouting distance, but we separated and kind of came back together to discuss what we'd seen and what we should do next. Now, that's the way we located Carlin, initially. We followed those contacts and collected samples, and I told you we got some assays from the top of the ridge.

Afterwards, when we decided, "Well, this is a place where we should spend some time and do some mapping," we didn't have detailed maps of that ridge. We had the topographic maps. We could blow them up. Even at that time copying machines weren't as accessible as they are today, like the Xerox-type dry copier was probably in the development stages at that time, so you just couldn't take a map and blow it up or shrink it down or make copies for the field. So what we did, we got the Bureau of Land Management maps, I think, which showed positions of the sections and the section corners—they'd all been surveyed in the last century. In the corners and sometimes halfway along the sides of these sections, they put in a metal marker. We used to hunt around for these markers—and some of them were inscribed which section and which corner and so on—and use those for what we called Brunton and pace traverses.

We both had a Brunton compass, which was quite accurate—down to less than one degree, when it's used properly. We used to shoot each other; like John would go, say, 100 feet, 150 feet in that direction, and I would shoot him with a compass, and he would shoot me. We'd make sure we had the same reading, so we'd plot it. The distance between the two points, we'd pace it out. Initially, we used to check out pacing against the tape, but after awhile you can pace out 100 feet with reasonable accuracy, within a couple of feet. John was taller, and still is taller than I was, so his pace was a little bit more than mine. So we had individual gauges as to what the distance was, but we were quite accurate. What you used to do is do a traverse and come in a big circle, or at least finish up by the end of the day. Sometimes you finished up at the same point as where you started, probably two or three times a day, if you were doing a series of loops around, but when we plotted that up—and we plotted it as we went like in the field—we should finish up at that same spot, if we were accurate. We did that very well—almost surprising ourselves at times. So we did Brunton and Pace traverse.

As we went along, we looked at the outcrops and recorded what we saw. John might say, "Well, this rock over here is interesting. Let's survey this." So he'd stand on it. We'd shoot each other. We'd measure it in. Then, we'd examine the rock and mark on the map what we needed to know, shall we say, and probably sampled it, and marked the sample number on the map. Over a period of two or three months you begin to develop quite a detailed geologic map. One or two places you go back to and, probably, look at the rocks again and reinterpret the rocks or resample, but after awhile, you've got a pretty good geologic map, and it's all tied in to these section markers, section corners.

And so, for each sample you not only marked that sample as to where you found

it, you marked it on the map, too, so you've got a match.

Mark the number on the map. Later, we'd take that same map. We used to have aluminum folders in 8 ½-by-11 size, real small ones. After awhile you'd work your way off this sheet onto the next one, so you finished up with several sheets. When you came back inside, to plot up all this data, you put several sheets out and then put a sheet of tracing paper over the top to make it all into one sheet, one map. So you'd trace it. When you get to that stage you can make a map, which can have all the outcrops on it, or the next sheet you could say, "Well, we won't put the outcrops on this. We'll put the geologic boundaries." So it's a much simpler thing. They used to make maps like that, so it's easier to explain it to people. There's not as much clutter. Or we could produce a map which just has the sample points on it and the sample numbers. If people wanted to compare them and put them all together again, they could just overlay these maps. You could use the initial database to produce a lot of working maps, which we used for our own interpretation and for presentations for people like Fred Searls and Bob Fulton, who came in every once in awhile to see what we were doing. Those maps worked very well.

You mentioned that it was helpful that you got your assays locally, because you weren't shipping things out. Were you shipping reports out? Or were you calling reports in?

Oh, yes.

Was there any way for people to trace down those kinds of things?

Well, no. Frank Phalen was the postmaster in Carlin, and he turned out to be a good friend. Initially, he was an amateur prospector himself. As soon as we got into town we

opened a post office box, because we knew we were going to get mail. Frank, asking questions and so on, learned that we were geologists, and he knew very well that we'd be hiking in the field and coming back into town after the post office was closed. Frank was very good. He used to collect our mail when he closed the post office, take it to his home, and after supper we used to stop by his home and pick up the mail. So he became a good friend. If we wanted to mail anything out, we worked through Frank the same way. Like sometimes he'd take the mail to the post office and dispatch it for us and then tell us how much it was. I'd pay him. I don't know if he should have done that. Probably against post office regulation, but he did that.

Did you feel like you could trust him to keep quiet about what was going on?

Yes. Frank was very, very good, very trustworthy. We didn't get an oath of silence out of him but just let him know that we were working here, and we'd just like a minimum of publicity. Someone might come up to him and say, "What are those fellows doing?"

He might say, "Oh, couple of geologists working around. That's all." But, no, he was very good—a very good friend. Our friendship continued. We exchanged Christmas cards for years and years after that.

We developed communications. I remember when we were there in Carlin we thought it would be great if we could get a telephone installed in the motel. We used to go to the local tavern, and they had a private telephone, like a telephone cubicle set into the wall within the tavern, so you could close the door, and a light goes on, and nobody could hear what you were talking about, even though they could see you on the phone. That was the way we used to call back to New York and report in, but when we inquired about getting a phone put in the

motel, all they could offer was a party line. No way. Wouldn't work. So we had those precautions, but we got along fine, and the people in New York, if they wanted to call us, there were two places where we phoned from. I described the tavern one, but there was also a restaurant where we had breakfast, and New York knew what time we had breakfast. As the phone rang, one of the employees of the restaurant answered it, and sometimes they'd come around the wall and point to one of us—Pete Loncar, myself, or probably someone else—and point to the phone. So we knew very well it was New York calling, because seven o'clock in the morning in Nevada was ten o'clock in New York.

And was the restaurant on a private line, or was that party line?

The restaurant was on a private line, but when we had these conversations over the phone they were very short and to the point and not a lot of speculation whenever we talked. It was around the corner to the back. It wasn't right where people were eating, necessarily, but it was still a public place.

Right. So, you used both the mail and telephone for communication. Mail for reports, more detailed information.

Yes, just put them in an envelope and mail them.

And phone for brief kinds of communication.

Yes, contact, communicate. It worked.

I was going to ask you about that, because you mentioned yesterday about the brown-bag lunch. How did you arrange for lunches in the field while you were there?

Oh, in the restaurant. When we went in we ordered breakfast, and the lady behind

the counter would say, "Well, what are you going to have for lunch today?"

Usually it worked its way down, "Well, beef today." So, you got a beef sandwich, and they usually put in a piece of pie and an orange or an apple, and that's what you took. So that's how lunch came about.

And then, you were back out of the field by dinner time, so that restaurant became pretty familiar.

We used that restaurant. There weren't very many restaurants in Carlin. We used to eat mostly at the Railroad Hotel, because Carlin was still a railroad town at that time. They changed crews, and the railroad people used to eat there, as well. I think the whole place is closed down and boarded up now. It was one of the central eating places in Carlin. There was another restaurant, I remember, up on the highway.

Did you stay at that Railroad Hotel?

No, we stayed at the Scott Motel. It was up on the highway. It was Highway 40 at that time; the interstate was built later. It was a two-lane road all the way through Winnemucca, Battle Mountain, through Carlin to Elko, and the road wound around in the canyon between Carlin and Elko. Now, they put a tunnel through, which keeps the road a lot straighter and a lot shorter. You can still see the old road, but, you know, it was different.

So there were motels and restaurants. It was obviously a center of activity. Was this because it was a railroad town?

Carlin was a railroad town. Elko was more of a commercial center for the ranching industry. At that time, there was a thing for Hollywood people to have a ranch somewhere near Elko. Jimmy Stewart had one. I'm not sure where it was. It was in vogue

for Hollywood people to own ranches. There were some wonderful ranches backing up to the Ruby Mountains around Elko.

Beautiful scenery. As a young, single man did you go to town? Did you get out of Carlin and go to Elko or Winnemucca at night?

We used to go to Elko every once in awhile. We'd go to a different restaurant, go to the casino. We probably, on the average, one or two nights a week, we went to Elko.

You didn't go the other direction to Winnemucca?

It was twenty-five miles to Elko. Winnemucca is quite a long way from Carlin in the other direction. When I was working in Valmy, it was a choice between Battle Mountain and Winnemucca. Winnemucca was still further away, but we did go into Winnemucca once in awhile.

Did you see movies, go to dances, any of those kinds of things, in that area?

No. We didn't really go for a big social life. We'd go and see some of the shows, perhaps, and get a good meal. We quit at ten o'clock, or something like that, because we had to go to work the next day. To go into Elko was just a change. We used to go down to the Commercial. There were some of the people that I worked with there. This was later on. We enjoyed the boxing. Now, at the Commercial Hotel there were some of these closed-circuit television programs of the boxing. They used to charge you five dollars. We used to go down and see some of those. Who was it? Muhammad Ali and Sonny Liston. They were fighting about that time, I think, and Patterson—some of these names. There would be a crowd of a couple hundred there in the Commercial Hotel watching. Sometimes the fights lasted less

than a round. You spent your five bucks for about two minutes. The next time you might get, for the same five bucks, about an hour of entertainment. Things like that we used to take in, sure, if they fit into our schedule, because if someone came in from New York, and their time was focused on the work we were doing, we might have to skip those kind of things.

I was curious about your access to information, news about the world.

Radio, mainly. We had radios in the motel, our own personal radios. Trucks had radios. So we didn't really starve for news. We didn't have TVs at every turn. There were no TVs in the room, and there weren't plenty of sports bars like you see today, where there are TVs all over the place. It wasn't like that then. We used to read the newspapers. They were local papers, like the Elko paper. We used to get the *Salt Lake Tribune*, was it? And the Reno paper used to come through. Sometimes we'd get it a day late, but we'd still read it. At least at that time we didn't feel news starved. At the same time, I used to get my professional journals redirected to me, and so it wasn't really the same as receiving them hot off the press, but you know, I was able to keep up and keep in contact with the professional community in that way. We didn't feel isolated there.

You mentioned learning from John about being out and actually walking around, being a prospector. What else can you remember about working with John Livermore?

Well, John was a kind of person who didn't waste any time. We worked seven days a week, and we worked fairly long days. We'd be out there at least ten hours a day, sometimes more than that. John was dedicated to what he was doing. He really enjoyed it. It didn't come over as a chore, because you

sensed that you were finding something new, and it was enjoyable doing it. It was stimulating. That's the secret. So, when I look back on that period, irrespective of the discovery, which was great, of course, but the experience was probably exceptional, because I was only a young fellow, still in my twenties. I had a lot to learn, so I was fortunate in being able to learn from a person like John, and I was also fortunate being able, in the course of my career in my twenties, to visit and work in all these different environments we talked about. Cumulatively, you learn from one against the other, and you might think doing work, say, in Africa would be quite different from doing work in North America, but it's not. Some things are quite different, but some of the fundamentals are pretty much standard.

John was a little bit older than you? You were in your twenties, but he'd been out and had some experience.

John is about twenty years older than I am. When I was in my twenties, he was in his forties, and he's still going strong. He's very good. When this article came out he was seventy-one. That was ten years ago, so he's eighty-one. You wouldn't think it. As he says, he's got the right genes.

You worked together, and you stayed at the same motel. You were practically with each other twenty-four hours a day. Did you have any running jokes or any of that kind of thing going on, do you recall?

None that I remember. We were very compatible. We didn't need jokes to cement our relationship and things like that. We had our moments, I guess, but, really, when I say "our moments," I mean moments that we really enjoyed and found ourselves laughing and really enjoying ourselves, but we didn't really need those to make our relationship work.

Were you compatible in your work styles also, or were there differences?

I think so. Yes. I liked the way John did things. I think he liked the way I did. Like I drafted all the maps, because he said I made better maps than he did, but it really worked out very well.

I'd like to ask you about some of the other people that you worked with, too. Pete Loncar—how did you find working with him? You'd met him in Washington, correct?

Yes, I first met Pete in Spokane, Washington. Pete originally comes from Nevada. He probably told you that. He comes from Goldfield, I think, that area of Nevada, so he was quite at home in Nevada. When the drill program started he was really thrilled to get back into Nevada and anxious to bring his family down there. In fact, the first house he lived in there in Elko was really small, and Pete had a fairly large family. I forget how many children—five or six, maybe, at that time. They were in a small house that really should only have accommodated, probably, three or four people, like two parents, two children, but he was so anxious to get back into Elko and to work in Nevada. Pete was another fellow who really worked hard, and a very reliable person. He came up in the environment where you learn from others, and he knew how to operate equipment and how to get things done. Of course, he is quite a few years older than I am, too, so I learned by observing him, the way he did things. I was the new fellow.

You were the kid in the group?

That's right—to Pete—but a different person to John Livermore, and I don't say that in a negative sense, because we're all different. Pete was sometimes described as a busier person than John Livermore. John

Livermore seemed to take things a lot more in stride and a lot more easily, accomplished a lot of things, did a lot of thinking and things like that. Pete was very good at organizing people and describing things. Like when he had people working for him, he made absolutely sure that they knew what they should be doing, things like that. So, he spent a lot of time talking to them and making sure they were collecting samples, showing them how to do it. So, he was a very good teacher. A lot of people that have worked with Pete over the years rate him up there as one of the best people they've worked for. Generally, around any project Pete is a great asset, as either an organizer or a manager. When the drilling program was finished at Carlin, he became the mine superintendent, one of the senior people in the mining operation, and he enjoyed that, thrived at it. He really did.

So, you had some really good people to learn from at this point. Pete was native to Nevada. What was your reaction when you first came to Nevada? This is a very different environment, as you say, than the Philippines or Alaska or Africa, where you'd been before.

Yes. Well, it's new territory and wide-open spaces. In some of the deserts or dry areas I'd been to in Africa, you still had trees. In Nevada it was sagebrush, so you've got the wide-open spaces. I'd read about Nevada, probably seen movies about Nevada, so I knew what I was going to see. It's always the case, when you get there you see more. Like a photograph is this wide. When you're standing there on the hill where that photograph was taken, you can see much more. So even though you recognize it, you get a different feeling when you're actually there, and that's true everywhere you go.

Yes. And I would guess, too, the reality of being out in the field with no trees is that

you're operating during the day without shade.

Shade and also, when it gets cold in the winter, that cold wind comes all the way from the Sierras. So you understand these things, and you learn to live with them.

Quite a difference from Africa, though, where you'd be out for two weeks, and you had to take your groceries. Here you were out for the day and took a lunch.

We didn't have to bother with groceries, because we went down to the restaurant.

Yes. You still had to make sure your truck was in working order, but you didn't have to stockpile gas.

That's right. You just filled up with gas every day. It was pretty much the same as it is now. Nevada hasn't changed a heck of a lot. In some of the more remote areas getting away from the highway, it would take quite a bit of time to drive back and forth every night, and time is money, especially if you have quite a few employees. They set up these trailer camps, which are quite comfortable for stays of a few weeks, but you don't see so much of that, perhaps, in Nevada, as you do, say, in Canada, where there are no roads, and you go out there for the whole summer, and you have to build your own camp. Used to be tent camps; now they can take out these commercial trailers. Sometimes they take them out over the frozen ground in the winter, so that when the people get there, the trailers are already on the location. They just have to be set up properly. So we did a lot of that in Canada.

Kind of a modern-day version. Back in the 1930s and before, they built boarding houses right near the mines in Nevada, and they had the tent camps, too—the wood-platform foundations.

It started with the tent camp. As the place grew into a bonanza town, they'd build all kinds of bars and opera houses and things like that, because you get those through the mines.

One of the things that you did a couple times a week was take samples to Harry Treweek, and you also mentioned that you stayed at one point with Harry and his wife, Clemmie. Describe what that was like for you, when you stayed with them.

Well, Harry and Clemmie lived down on Gold Acres, on what we called the Little Gold Acres property. I don't know if they'd be happy with me describing it as a cabin, a single-story place, wood. It was comfortable inside, very nice. They had at least two bedrooms—because when I was there I had a bedroom—and a living room, and a . . .

That's not unusual out near a mine—the homes are small?

That's right. And the assay office, where we assayed the samples, was nearby, but a separate building. That's all they did in that building. I don't remember where Harry got the equipment, whether it was 100 percent his own, or just the equipment that was at the mine originally, and he was using it and maintaining it, but he had a very well-organized laboratory. It had a dirt floor, at least part of it, with crushers and pulverizers. That's where you break down the rock, and then, the places where he had his furnace, like in the fire assay, you mix the rock with some chemicals and then put it in a furnace and melt the rock.

There are a series of processes. Toward the end of that time, you separated out the gold. In the process of fire assaying in the furnace, you collect the gold in lead. You get a lead button, and then you have another furnace where you heat up that lead button,

and the lead evaporates, and the gold and silver stay behind, so you have a gold and silver button. Then you can treat that button to dissolve out the silver. That leaves the gold. Then you have to weigh the gold. You calculate ounces per ton by relating the weight of the gold to the weight of the original sample. You come up with so many ounces. Harry did all that in the laboratory there.

He had very sensitive balances, very good furnaces. Controlling the temperature is very important. He also had a good control on his sample prep—that's where you break the rock down and pulverize it—because it's very important to get the rock to be homogeneously pulverized, not to have big pieces and small pieces, but to be essentially all the same size. Part of this is experience—feel the rock, "That's about right," or "It's a little coarse. It's got to be pulverized some more." Harry was very good at that. When he looked at things and felt things, even small things, he'd tell us things that were operating properly. Good, old-time assayer. He would look at the rock types, too, because if the rock was silicious and gritty to the feel (and sometimes you could recognize the silica just by looking at it), he'd change his chemical mix. If the rock was limestone, there'd be another mix, and so on, all based on experience. You'd ask him, "Why do you change it? Because of this?"

And he'd say, well, it was his experience, "You need a little less of this and a little bit more of that." He didn't go through a book and learn it.

He had the recipe down by feel and smell and the sense of the rocks. Did his wife help him with the work?

Yes, she did a lot of work, and we provided him with some help at times, when the load got big. We used to find people that he liked to work with. Clemmie put in lots

of hours. Sometimes, even though they probably didn't tell us, I'm sure they worked into the night when we weren't there. So that was another relationship that worked out great, and it developed strong friendships as a result.

Harry had a weak heart, and he died about 1985 or 1986, but Clemmie visited us when we were living in Denver, and one time she visited us when we were up in Toronto. So, you know, the relationships continued. After Carlin was developing into a mine, they moved out of Gold Acres and up to a house in Carlin. He worked as an assayer for the mine. He set up the assay lab of the Carlin Mine, the first one. That was a time when technology was changing.

I've described to you the way Harry did his assaying. The method of assaying that I described Harry using at Gold Acres is the classic fire assay technique. When Carlin was going into production, some new technologies—particularly atomic absorption spectrophotometry, AAS—was becoming available in North America. This was an instrument that allows you to measure metal concentrations from solution, where you have to get the sample into solution. It's quite a long story how that got used at Carlin, but Harry was involved in developing the methods of atomic absorption that were used in the assay lab. They didn't forsake fire assay, because you got all those years of experience and confidence in the fire assay method, but what they used to do with the atomic absorption, initially, was dissolve the gold in the sample with cyanide, just like they do in the mill. They'd treat the sample with cyanide in a beaker about the size of this glass of water. You warmed it up, and then the gold would go into solution. You could measure that using the atomic absorption instrument. They would compare it with the fire assay.

They found early on that they could get pretty good correlation, acceptable correlation, between the fire assay and the atomic

absorption for the ore samples that came from near the surface, like in the oxidized region. As you went down in Carlin, the oxidation became less, because it's the exposure to the surface, or proximity to the surface, where you get the oxygen for the oxidation. A little deeper down, the ores become more refractory. They are associated with carbon and sulfides, and when sulfides oxidize, the sulfur gets separated from the metals, so that in those sulfidic and carbonaceous ores the cyanide didn't do such a good job dissolving out the gold. So when they analyzed some of that material by the cyanide technique and the atomic absorption and compared it with the fire assay, they'd get higher values in the fire assay. This had major implications on the mill, because they were going to use cyanide there. So, it was quite early in the operation of the Carlin Mine that they discovered that they had these refractory ores, as they came to be called. They had to change their metallurgy and their mill in order to accommodate these ores and get the gold out of the rock, which they did over time.

It's become quite a big thing. The first mill they put up at Carlin was a relatively simple operation. It was a basic cyanide mill with grinding and so on. It was a simple mill, but the latest technology for the time. It was a mill that, when the mine opened, you got lots of photographs in the technical magazines, people sitting down with computer screens and panels operating the mill. Some of the latest mills that they built up in Carlin (or along the Trend, not just Newmont) are much more complex and much more expensive, because now such a large proportion of the ore is indeed refractory ore, which is more difficult to treat. The latest mill that Newmont put on there cost \$300 million. It's quite a complex plant.

So, this process where they were comparing some new technology—the atomic



Modernized processing at the Carlin Mine. "Some of the latest mills that they built up in Carlin . . . are much more complex and much more expensive."

absorption spectrophotometry—to the classic fire assay began the whole process of understanding.

Yes. It clued Newmont in that there were metallurgical variances there, which were important.

Interesting that Harry, who was so good at the classic fire assay, was also on the cutting edge of the new technology. He was not limited to the old ways.

Yes, that's right. Harry and I used to talk, because the way technology was developing there, you read some technical papers where assaying would become fully automated. This kind of worried Harry, because assaying was his livelihood. He didn't want to be replaced by an instrument. I assured him it

would be a few years, if that did happen, before it would replace the assayer. The technology has come and with some very sophisticated instruments, but there's still got to be a chief assayer, and again, someone who was experienced and understands not only the chemistry of the assaying process but also probably a little bit more electronics. Like probably two people now—an electronics person, plus the assayer running some of these more sophisticated assay labs that exist.

Harry's style, where you needed to know the feel and the smell of the rocks—is that useful anymore?

Yes. People still do fire assay in exploration. In order to get precise assays for gold, we'll do a fire assay to get to that lead but-

ton. I told you they used to put the lead button in the furnace to evaporate the lead. Well now, they take that lead button and dissolve it and everything that's with it to get the metals into solution. Then, that solution will be fed into these instruments. So there are variations using the technology plus the tried and true fire assay technique that developed over time. I've got a series of catalogs there describing a lot of those different methods that have evolved, let's say, over the past thirty years.

It's interesting to think that you were there at a time when the microscopic gold, even though that wasn't a new idea, was actually now coming into its own, in terms of being a viable product, and that the technology was changing in terms of assaying and actually processing the gold and so on. That was all happening about that same time.

I think it's true, you know, if you look at it in a broader sense, whenever there's a new development, and it's a significant new development, especially when the development is well financed—like Newmont had the money—they introduce the latest ideas, the latest technology; they can get the best people. Even if they have to go out and buy them, they can get the best people either as consultants or employees. They can get the best technology or the newest technology. So, you bring it all together, and things like what we've been talking about happen. Carlin has got to be fully in that category.

The new technology starts being adapted for the new discovery.

Yes. What's good in the new gets incorporated into the operation, whether it's the assay lab, whether it's a new type of truck, whether it's a new way of doing things in the mill, whether it's a new way of surveying. Anything like that gets incorporated.

That's the advantage of having either good financing at the beginning or good cash flow as the operation proceeds, because you're more or less obligated to stay competitive to do that. Otherwise, people will start producing gold cheaper than you can produce, and the market will have its say.

I know we talked about the importance of technology and how it should be fitted to an exploration operation, but you do look at the introduced technology into exploration, as opposed to a mining operation like Carlin. New technology takes you to a different level. What it does, it allows you to do what you've been doing before, better. But also, at the same time, it opens up other possibilities, which allows you to build on the next level. Eventually, that will lead to new technology, and you do it all over again. So you have a series of steps of improved exploration methodology and technology. The secret is, as I said before, how you manage it and use it in the field.



I'm not sure that we finished up on the work at Maggie Creek and how that turned out. Could you talk about that?

Yes. When we first went up to Carlin, that was June of 1961, and we had permission to examine some claims in the Maggie Creek area, which, I think, is seven miles north of Carlin, but our exploration further north, initially in the Blue Star region and then later in the Carlin area, overshadowed what we did at Maggie Creek, but we did quite a bit of work there. Well, let's put it this way. We got to the stage where we did our geological mapping, similar to the way I described it, but it wasn't until 1962 that we started doing any, what you might call, more expensive work—bulldozer trenching and drilling. The work that I was involved with was more or less completed in 1962, and we found evidence of mineralization there in the drilling

but not in amounts that were exciting to us, especially when we were getting much better and more exciting results further north.

Do you remember what the values were in this section?

Yes, they were short intervals of 10 feet of 0.15 ounces of gold per ton, and 5 feet, similar grade. What we were looking for that time was that kind of grade, 0.15, but more extensive material. What is significant about that, though, is that some of those intersections I just quoted now were kept in Newmont's records, and later on, when they were developing the Gold Quarry pit, they used some of those drill holes to incorporate into the ore-reserve calculation for Gold Quarry. So, really, even though it was very peripheral-type stuff, it was the edge of something much bigger, which was buried under overburden to the south at Gold Quarry. It makes you think—if that's all we had to work with, and there was no Carlin in 1961-1962, whether we would have extended our exploration a little more to the south and probably stumbled into Gold Quarry. Gold Quarry was developed because it was an extensive low-grade deposit. The grade of the gold in Gold Quarry is much, much less than the grade of the gold in the Carlin deposit. So the likelihood would be, if we'd found Gold Quarry in 1962, it would have been too low-grade to develop. We might have walked away from it. Sometimes you wonder. Well, you'd probably hang on to it to see if the gold price is going to increase, but that's speculation. We walked away from Little Gold Acres—a million tons of .11 or something like that—because it was too low-grade. So we'd probably have done the same thing if we found Gold Quarry at that time.

Times and market prices make a difference in how this all turned out.

Yes, right. So, that's my recollection of the Maggie Creek property, but it's quite likely that they might have done some more work on that after I left in 1963. It's kind of interesting to know that some of the holes we drilled in 1962 were later incorporated in the ore reserve calculation for the Gold Quarry, which is really the biggest open-pit there, unless the Goldstrike, one of Barrick's mines, is bigger by now. Gold Quarry is certainly the biggest in Newmont's mines, even though it's a lower-grade deposit.

You talked about the day that you had lunch and sat on the outcrop and happened to pick up this rock that you wouldn't normally have paid any attention to. When you think back, what made you do that?

Curiosity. It was not really a smart remark for a geologist, but the thought goes through my mind, "What if those porous-looking rocks soak up gold? Let's try it." I threw a few pieces into a bag. Scientifically or even professionally, that's not very profound, but that was the thought.

It turned out to be very significant in the way we came to understand the distribution of gold, because one thing led to another thing very, very quickly. First of all, that was a place to drill, and we got that magnificent intersection. Secondly, it made me more aware that some of these rocks that don't look too well-mineralized might be mineralized, and that turned out to be the case. Within the space of a month, we knew so much more, appreciated so much more. It was just like turning over a new page and finding all the answers on that new page.

Just based on that impulse of that moment.

I could have had lunch somewhere else.

Or you might have had somebody to talk to. If you'd had somebody to talk to, would that thought have come to you?

We'd probably talk about baseball.

Instead of that. [laughter]

That's right. [laughter]

Where was John that day? Do you remember?

John was in Canada.

Oh, he'd already been promoted and was gone. So you were working alone?

Yes. I wasn't the only one in Carlin, but that particular day I was mapping that area by myself.

And you were the only geologist on the job at that point?

I think so. Yes. So, you know, there'd be probably Pete Loncar, who'd got the drill down at Maggie Creek that day, or something like that. I forget. As you know, we were working together, but working in different areas.

So, while John was there you made some initial discoveries that were fairly important, and then, after John was promoted and gone, was when you picked up the float, and that sent you off in a whole different direction.

Yes. The culmination of the program that John and I did together was that trench with the eighty feet of .20. And then it snowed. John reported up to Toronto in January, same time Mort White and I went down to Pioche. John stayed up in Canada. He was

there for a decade before he came back and formed Cordex or Cordilleran Exploration, whatever it was, with Pete Galli. I worked for John up in Canada when I went up there, you see.

You were working for Newmont, a corporation, albeit still a small corporation at that time. Can you describe to me how decisions were made? You talked about a process where, for example, John was interested in the gold, and Newmont was still working mostly in copper, so he put together a proposal. So, I'm interested in how decisions were made within the company, and what was left up to you, and what was made by other people higher up on the corporate ladder, so to speak. Could you describe that a little bit for me?

I think in Newmont, especially in those early days, we were encouraged to develop our ideas and kind of pass them up, if you like, through the different seniority. And that's what John did there. He was aware of this invisible gold, and developed a proposal by talking to people and getting their ideas and putting them all together and identifying an area where he could go and look for this stuff. That's what he put to Newmont, and it really is quite neat, and Newmont accepted it.

And how would that proposal have been presented? Was it strictly in writing? Did he go and talk to people about it? Do you know?

Well, I think a lot of it was verbal, but then again, I'm quite sure there's probably two or three memos in the file that I haven't seen, where John put down his ideas, because even though you could talk to Fred Searls and Bob Fulton about it, other people in the corporation like Plato Malozemoff

wouldn't be there, and to present it to him, it would probably go into a memo, which could be supplemented by comments that Bob Fulton and Fred Searls could give him when they were in New York, too. I'm sure it was done like that. It wasn't anything very formal—glossy presentations and slide shows and things like that—not at that time. Perhaps that's the way it's done more often now, where you develop a budget, and then you support your budget with all kinds of presentations and glossy covers and colored slides and things like that. More marketing.

So, if John put together his ideas, spoke to Fred or Bob or both, then how would the decision have been made from there to put resources towards this proposal?

Oh, well, essentially, the proposal was accepted, and we were given some money.

And who made the final decision? Was it Plato? Or was it Fred?

Well, I'm sure Plato would approve it, but I think Bob Fulton would have a budget, and he'd find money in that budget to support that project. So would Fred Searls at that time; he might have access to some funds, which he could dedicate to that program.

Bob Fulton was over exploration. Is that correct?

Yes, he was the senior exploration manager. He wasn't a vice president at that time. Fred Searls was the past president, past chairman. [Fred Searls was Chairman of Newmont Mining Corporation in the early 1960s. He was President prior to 1955.]

And Plato?

President at that time. Plato might have been chairman, too.

So, it was a decision that could be made within the different departments. It didn't have to go through board approval or anything like that?

No. The overall major budget would probably have to get board approval, but the way the money was reallocated within the budget, that would be solely among the officers of the company—and not a lot of officers at that. Probably only three people had to agree.

Once the resources were allocated for the project, where were decisions made? Were they made in the field?

Yes, primarily in the field. We would do the work, and we would generate our own conclusions and ideas, and when people came to visit us, we would explain this and show them the evidence for it, because that's the beauty of being in the field. They would keep the rocks with us for awhile, you see. Based on those findings, we made suggestions as to what we might do, like stake claims or drill, rent a bulldozer, make some trenches. Usually, things like that were approved on the spot. We'd take some time to estimate how much it would cost. We were probably saying, "Well, that sounds like the thing to do." This happened more than once, "When are you going to get a bigger bulldozer?" It cost a little bit more per hour, but you get more work done. They would like our ideas so much that they would encourage us to do a little bit more. That kind of decision making flowed quite smoothly. Later on, when you started talking about big money—hundreds of thousands of dollars or more—getting to the development and so forth, then there would be a more formal presentation, but at those exploration stages, the decisions can be made by senior officers. The approvals can be made by senior officers. When I was up in Canada, the vice president myself—that's the way I could op-

erate. I'd have people working in different places. If they needed to put in a couple more drill holes, as long as we could find the money, and I liked what they were proposing, I would say, "OK. Go ahead." Because it was easier for me to justify to people I was responsible to, and that was my job. It was still similar at that time, but then again, if we came across something new, say, a prospector came in through the door, and he's got a property twenty-five miles down the road, we went to see it, and it was good, we wanted to make a deal and might have to give him a down payment and commit monies, say, at least for one year for one program, which might amount to several tens or a few hundred thousands of dollars, then, we'd have to go back to get that approval. If the money was available within the general overall pool of exploration funds that had been approved, then, if it was worthy, we'd get some of that, but if it was new money, then it had to go all the way back probably through to the board of directors, but certainly to the president of the company.

We wanted to talk a little bit today, too, about the importance of the micron gold.

Yes. Well, one thing that we haven't mentioned quite so much is that around the beginning of the century, in 1905-1907, they discovered placer gold in Lynn Creek, which is not very far away from the Carlin Mine. In fact, it's about a couple miles north of the Carlin Mine, but in order to have placer gold, you got to have coarse gold, which is visible, and you pan it.

This discovery was made, as I say, in 1905-1907, and subsequently they found gold in some of the other creeks around Lynn Creek. This gold actually had a source in the bedrock, again, to the north of the Carlin Mine, not specifically from the Carlin deposit. I can say the Big Six Mine is an example where you have vein-type mineralization with coarse gold associated with it,

and with the weathering this gets down into the creeks. What we discovered at Carlin was gold that was much finer. Now, this was the invisible gold, or micron-size gold, micron measurement, which was recorded by Vanderburg in those reports that he wrote in the 1930s, and John Livermore read about in the 1940s. Vanderburg mentioned some other mines in Nevada, where that kind of gold occurred, such as Gold Acres. Another one was the Standard Mine in Pershing County, where John Livermore went to work in the late 1940s, early 1950s. He was very interested in that deposit, because he'd read in Vanderburg's reports about very fine gold, which you can't pan, and he recognized it. I don't know how long he stayed there, probably a couple of years or more, before he joined Newmont, and Newmont started sending him to different countries around the world in the early part of the 1950s.

So, not only had John Livermore read about it, but he had had some actual experience with this invisible gold.

Yes. If you read this *The New Yorker* article, some people in the Battle Mountain area credit John Livermore as being the discoverer of the invisible gold, going back to his experience with the Standard Mine. When you talk to John, he'll tell you a different story—his attention was first drawn to this invisible gold by the Vanderburg reports.

Gold Acres is the one that had gone out of business. Is that correct?

Yes, Gold Acres was operating in the post-World War II years, and actually closed in 1961.

And that's where John had talked to Harry Bishop, and Harry had referred him up to Eureka, rather than Lander County.



The Standard Mine. A site for the “invisible gold” John Livermore researched in the late 1940s to early 1950s.

Yes, that's right. Now, going back in history a little bit more (and I got this information from Larry Kornze), there was another deposit in Utah, not far from Salt Lake City and a few miles south of Bingham Canyon, called the Mercur Mine, which is a gold mine. Originally, it was a silver property. I think that initial interest way into the last century was for silver, but they also found gold there, and there's a record. I don't have the documentation, but Larry Kornze was aware of this. They sent samples from

that Mercur deposit to Salt Lake City for assay for gold and silver. The assays came back quite high in gold, as well as some silver, I'd guess. The people who owned the property at that time went back and started panning for gold, and they couldn't find any. So, there's a record of a legal suit against the assay lab for reporting gold that they said wasn't there. Now, I don't know what became of the lawsuit, or anything like that, but that's an interesting record. And, really, what they were working with was some invisible gold

in the Mercur Mine, which is over in Utah, not in Nevada, and the date of that is the 1880s. That's as nearly as I can pin it down.

So, that's one of the earliest times that it was showing up in assays, but people still didn't know what they were dealing with?

Didn't believe it. Didn't believe it. So, I always think of that as being the earliest record of invisible gold. Now, Vanderburg doesn't mention that, but then again, he's reporting invisible gold. No one in Nevada in the 1930s and probably earlier than that, back into the 1920s, you see . . .

Rather than in Utah.

Yes. So, that's the kind of time frame. The Standard Mine was known in the 1930s. It was mentioned by Vanderburg, but the Mercur Mine wasn't.

At the Standard Mine, for example, and Gold Acres, were they using just the traditional cyanide method of getting the gold out? And were they using the fire assay, also?

Fire assay to determine what the grades are, yes.

Because they were already seeing that they had to assay in order to know where it was, because you can't see it.

Yes, that's right. That's what Vanderburg says. I quote it in here, you see. You have to assay everything to find out where the gold is. That helped develop the expertise that Harry Treweek had at that time. It was traditional, classic fire assay. The atomic absorption machines and things like that weren't even thought of in those years.

So, it had been around, but it just was not well known.

Fundamentally, it's appreciating that that gold was around that captured John Livermore's interest and opened up the possibility that there was gold out there. I'm not saying a whole lot of gold, but gold out there that the old-timers had missed. Now, the placer gold in Lynn Creek meant that the old-timers panned virtually all those creeks along the Tuscarora Range from Bootstrap to Carlin. You can almost guarantee that they did that. They didn't find Bootstrap; they didn't find Blue Star; they didn't find Carlin; they didn't find Gold Quarry, and so on. They got a few colors in Maggie Creek, where we were, and there is some mineralization there, which has base metals in it—the Good Hope claims, which have some lead and zinc and some silver and gold. That's probably where that gold in Maggie Creek came from, one of those old claims, but they're not the type of mineralization that occurs in Gold Quarry and Carlin and other places. The old-timers, because they relied on the gold pan, missed it. That's what we were hoping for—what John Livermore was hoping for, as part of his proposal.

That they had missed it. I was wondering what the connection was with the old-timers, because they had obviously worked in all that area, and that was a signal, as well as the reports about the invisible gold.

Yes, well, could be a signal. Like when we got there, in 1961, we knew about them, so we knew about Bootstrap. We knew there was invisible gold there. When the old-timers were there they didn't know and didn't even suspect. Before 1920 the old-timers were going through and made their initial discoveries at the turn of the century. They opened up Bootstrap as an antimony mine, probably in the 1920s. The Blue Star was a turquoise mine, again in the 1920s, surrounded by gold, and they didn't know about it. It wasn't until the 1950s, perhaps a few years before we got there, that they were

finding gold at Blue Star and finding gold at Bootstrap.

So, what you're saying is there was no connection between the gold that could be panned and the microscopic gold. Is that correct?

That's right. Genetically, there may be some connection. Like you can get the concept, and I don't know if it's been proven yet or disproved. The sources of the gold would be at depth, and it came up along fissures and things like that. In the Carlin deposits they kind of spread out, either in broken rock or chemically favorable rock, to form wider, larger deposits. Remember, the Carlin deposit wasn't sitting on the surface like it is now, or like it was in 1960. It was buried by quite a bit more rock, which has since been eroded. Some people estimate probably as much as four kilometers of rock since those deposits were formed, so the gold bearing solutions, after they'd formed the Carlin deposit, or while they were forming the Carlin deposit, could move on, upwards, outwards, and so on, and they might have formed some mineralization in the overlying rocks, similar to what we find in the Big Six Mine today, which would crystallize as coarser gold. It's a function of chemistry and physical situation. Where the hydrothermal fluids percolated would determine whether the gold would be fine or coarse. Where the Big Six turned out to be, the conditions were more favorable for formation of coarse gold. Carlin and a lot of the other places had fine gold, invisible gold.

I don't know how many geologists might agree with what I just said, but very generally I think that's kind of the working hypothesis. Since Carlin was found, we found the roots or the feeders, like the plumbing to some of these larger deposits, which are high grade, and they're underground operations now, because you got to

go below the Carlin-type deposits, the ones that are exposed near the surface, to find their roots.

Which explains, for example, the Meikle Mine, which is one of the underground mines, because they found some of these roots that are going down deeper.

The Meikle ore body lies between 1,200 and 2,000 feet below surface (approximate measurements). So, there are quite a few underground mines. Luckily, the underground mines are higher grade, because it costs more to mine underground than it does from an open pit, so they are economic.

It's interesting, that's another cycle in the mining. It used to be all underground. Then it went to the open pit, and now they're heading back underground again.

That's where the gold is, yes.

And you've talked a little bit about the significance of the invisible gold in terms of the levels of technology and how it took things to a different plateau in that respect.

So, really, what I cover here is the history of the discovery of invisible gold. The earliest record I have is that record from Utah in the 1880s. Then, a growing awareness of this in the 1930s, probably extending back into the 1920s in Nevada. I'm not aware of any link between the Utah experience and the Nevada experience, although it's very likely there is, because talk like that would be the kind of stuff you'd hear around the campfire among the prospectors, but I haven't discovered the link, and Vanderburg doesn't mention Mercur. I don't remember it, anyway.

You talked about how people get gold fever. Basically, they turn into gold bugs, like John

Livermore. Would you consider yourself one, after all of this experience?

Oh, I think so. Not a hundred percent. I'm an explorationist. I enjoy going looking for lots of metals, things like that. Each one is a challenge, but prospecting for gold and finding gold is something special. You get a lot of satisfaction in finding a copper mine or a lead mine or something like that, but to find a gold mine, that's a little different. It has more public appeal. If you go into any group of lay persons and start talking about gold, you'll get their attention much more quickly than if you were talking about a lead mine or a lead discovery or a copper mine.

It's the intrigue and the romance of gold. It's got a long history, of course. A lot of metals have got a long history, but gold goes way back. You see these Tutankhamen and things like that and the gold that they used. I'm not quite sure who developed this argument; it's determined history, like the Spaniards came over to the New World for gold. The Romans invaded Britain for lead 2,000 years ago, because they used it for their armaments and cannonballs, and they used to pour lead on people when they attacked their battlements, so it was a lot of economics and power and wealth that drove people to search for metals and discover and plunder. There's the historical aspect of it.

You might have hit on the two that seem to have gone through the centuries: power and wealth. It's kind of that romance of the 1849 Gold Rush, "Oh, the chance to be rich, and to be powerful and wealthy."

It's another thing when gold was thirty-five dollars an ounce, and gold would stay that price. If you had a chunk of gold, you knew how much it was. If you had a handful of dollar bills, you were never quite sure whether it would be worth what it is or more the next year. To the traditional conserva-

tive American that was important. It's not so much today, because the gold price doesn't behave quite the same as it used to. It's more and more of a commodity, rather than a currency.

Yes, and we've seen that especially this last year with the struggle that the gold mining industry has had.

But there's more intrigue; there's more romance about gold than other metals.

Yes. I see it in your face, when you talk about it. When I asked you if you were a gold bug, I could see the smile. You went from here and went up to Canada and were there for twenty-five years, but you did return to Nevada in the 1980s. Could you explain what happened then, when you came back?

Yes, I came back as director of geochemistry. I remember I came down to Carlin to see if I could develop some sampling techniques, which would help them discover more gold. I did that, wrote a report, and so on, and some of those methods were implemented. Very soon after that, they transferred me down to Tucson.

So, you were just there for a short time?

Yes, I was just visiting Carlin at that time. I'd go over there for a week and then go back sometime later, stay another week or so, until that particular exercise was complete.

What were the sampling techniques that you recommended?

Well, we studied the soils, soil profiles. You can distinguish soil material that is resting right on bedrock, which is obviously formed from the weathering of those rocks, but above it on virtually all the hillsides was a colluvial cover. Now, colluvium is soil ma-

terial that's developed high up the slope, but under the influence of gravity is slowly moving down, so the colluvial soil that you find on the surface, like in the sagebrush roots, originated up the hill. It wasn't related to the rock down below. Our conclusion is, if you want to prospect the rock down below, you got to get through that colluvial material—sample some of the residual material below. That's one of the things that came out of that—instead of sampling at shallow depths, sample a little deeper.

That particular exercise was the prime conclusion. We not only studied the distribution of gold, but also the elements that occur with it: arsenic, antimony, and mercury. Of course, they have different chemistry. They behave differently. I was able to point out these differences in the patterns that we established in the soils there. You could use that, since arsenic is so often associated with the gold and tends to be more widely dispersed, like forms a bigger halo, bigger signal, bigger target to aim for. A different technique using arsenic can be developed, as opposed to another technique where you concentrate on the gold. You look for arsenic first and then follow up.

It will lead you to the gold. I see.

That kind of evolved from all that data. Then, the people that were doing the work could decide whether they wanted to do a detailed survey or a reconnaissance survey, and they could choose the techniques accordingly, because they could see from the data that I left behind what they should sample, how deep they might have to go to find it, and what intervals they should sample, things like that.

When you went back in the 1980s, what kinds of changes did you see over twenty years since you'd been there?

Well, the big thing, of course, was that almost everywhere you looked there was a mine. That's something that we didn't really envisage or imagine in the 1960s. We didn't think we were going to find a whole new, huge mining district. We were quite content to find a nice, new deposit. It wasn't beyond our thinking there might be some more there. In fact, I told you yesterday, we concluded there's got to be more, but the extent of it was huge. You can imagine. From Carlin up to Bootstrap, certainly between Blue Star and Bootstrap, it was essentially continuous. There were several different mines, different names, but essentially all mined or being mined. We didn't think like that, but that was the initial impact, right? Only the environment had changed. There were lots of geologists, dozens of geologists. When we worked there before, there was just one or two of us at a time, and the whole hierarchy was different. Decision making was different. Top decision making was done, not so much by geologists, but engineers who ran the mine. The environment in doing exploration was quite different.

The engineers decided at this point?

It changed when Carlin started up. The mine manager was ultimately responsible for the exploration that was done around the mine. In the 1980s senior management stated, "Well, probably we should take that responsibility away from the mine manager and let him run the mine and not be responsible for the exploration costs, and give it to the exploration people." Eventually, the responsibility for that exploration came back into the exploration department and the exploration vice president, who was back in New York at that time. That change was taking place during the 1980s, but the important thing was getting gold out of the ground and getting it out as cheaply as possible so that

the company made the maximum profit. That's the way mining companies establish themselves and make money. You got to have that. The exploration and so on was a necessity. That was carried on at that time, but it didn't have the prominence and perhaps the excitement that it had in the early years. You were a much bigger operation—not that when they found new deposits there, people didn't get excited. They got very excited, because it meant longer life for the operation and for the company and the people who were employed there mining the gold. They knew when *this* deposit was worked out, there'd be another one to work on, so you could see another ten years or more into the future. You had a place to be, a place to stay, and a place to work.

That's important for those communities and their people.

Yes. So, their operations had gotten beyond the time when everything was exploration phase.

Yes, and the days of sitting out there by yourself on an outcrop and having a brown bag lunch—that was long gone.

Now, you'd go up there, and there'd be drills all over the hills. Places where we'd been before. Some of that land we didn't control in the 1960s, and some of the areas we didn't really suspect that we'd find gold. We just hadn't developed that far.

When did people start asking you to tell your story about locating this? That would be a good indication of when this was beginning to be understood, the magnitude of it.

Well, I started putting this story together, which lead to the publication, *Carlin Trend*

Exploration History, in the late 1980s, probably 1989. The SME, which is the largest exploration and mining society in the USA was having a conference, and I forget where it was, whether it was based in Reno or in Elko, but part of it was going to be in Elko, including a trip to the Carlin deposits. Many of the people who were going on that trip were staying overnight in Elko. That was it. Newmont wanted to put on a dinner for them and also provide them with a kind of presentation or speech. I was in Moscow, in Russia, at the time, and I got a FAX from Len Harris asking if I would give a talk to them about the early days of the Carlin Trend—first time I had been asked to do that. I said I would. I put together a talk on that and presented it. I think it was at the Red Lion Hotel. There were quite a few people there—might have been a couple hundred—and it was quite successful. People enjoyed the story. So then, Newmont suggested that, since 1990 would be the twenty-fifth anniversary of the opening of the Carlin Mine, an account similar to what I'd given might be a good idea to include with the annual report sent out to the shareholders. When they told me that, I started preparing the text, which eventually came out as this document. They decided not to include it with the annual report, which came out about April of 1990. The manuscript was sitting there for a few months, and nothing seemed to be happening. We approached the SME to see if they wanted to publish it, and they didn't seem to be too eager to do it. Eventually, I called the people I knew at the Nevada Bureau of Mines and Geology and said, "Will you publish this?" Eventually they did. So this came out in 1991. This was all there was to say at that time, and that's essentially it, until the Oral History Program comes along.

You haven't been asked frequently about it?

Well, yes. Like Anglo-American at one time were coming through, and they wanted to know, "Could you talk to us about the history of the Carlin Mine?" *Carlin Trend Exploration History* was published at that time, so I took it along, and it was my notes, and I had one or two slides to correspond to the diagrams in here. I left them a copy, and that was it, because, essentially, it was this presentation. For one or two other people—I've done that kind of thing, too, but nothing more than that.

It's interesting to me that it was nearly twenty-five years after the discovery before there was an interest in hearing the story, and yet it's had such a significant impact on the mining industry.

Prior to the twenty-five years, there was an interest in learning the story, but I didn't tell the story, because I didn't think Newmont would want me to. It's a competitive edge that they might have. Little things like picking up that porous rock, things like that, which might give geologists clues on what to go sample, and they might get that before Newmont geologists, but in the early years, of course, in the 1960s and 1970s, Newmont definitely had the advantage.

By now, do you think they've all figured some of these things out, so it's OK to talk about it now?

Oh, yes. Well, there's a lot of discussion now about the Carlin gold deposits. It's a whole new class of mineral deposits, and various ideas about how the gold deposits formed have been put forward and presented in journals. Quite a few Ph.D. theses have been completed, and very often those theses become public information after awhile. People could have done that prior to 1989. But say, students at Colorado School of Mines or Michigan Tech or wherever, who

do these theses—you go into the libraries of those universities, the theses will be there. Sit down and read them. Some of those were written probably in the late 1970s and 1980s, prior to me doing this history, but this is not highly technical. This just explains the way it was and how the thing was discovered. It doesn't try to explain why the deposits are there so much as how they were found.

So even this would not have broken some of the information that they'd want to keep quiet.

There's a lot of detail beyond this, which, I guess, is still proprietary to Newmont, but I'm sure there are some other smart people out there who could figure it out.

It's interesting to me how the information starts, and it's secret, and then takes a certain amount of time Actually, we're talking about if the Mercur Mine in the 1880s was the first recognized invisible gold deposit, and we're now in the 1990s, then it took nearly a hundred years for all of this to evolve.

Yes, to become part of the modern mining scene. You wonder how many similar situations might exist out there. You go back and research old mining history, old mining texts, old mining reports. You might dig out something like that which would light a candle in somebody's brain, which might lead to a similar new development in mining history.

Sure. And I'm thinking like the whole beginning of this mining oral history project for Nevada started with some work I was doing in Silver Peak, which is where one of the first cyanide mills was built, and the whole cyanide process was something new in 1893 when that was built. It was just beginning to be applied around the world,

and so that was another one of those technological changes that made it really possible.

Yes, that's technological advance.

I know in Silver Peak that was something that really worked for the type of ore that they had there, so it made a difference.

It worked great at Carlin, too, in the early days. There were other things that developed since the Carlin Trend was found, like the heap leach technology. It's just a new method to extract gold from much lower grade ores. It's material you can't afford to transport and crush and mill, but you *can* afford to transport it and dump it, and then just sprinkle cyanide on top of it and wait until the cyanide comes out at the bottom and extract the gold from that. There's less cost involved in doing that, than putting it through a cyanide mill. Therefore, you can extract the gold from lower-grade material. That's an advance that I think was developed primarily with the Carlin-type ore. I hesitate a little, because there's quite a huge tonnage of this low-grade stuff, and when you calculate the

amount of gold that's in it, it amounts to quite a few millions of ounces. So somebody's scratching their head, "How can we get that out of there?"

So all these things that I explained before, they build on each other. You get much better at doing what you do. I think that's important to one record about invisible gold. If you read that *New Yorker* article, some people based in Battle Mountain were crediting John Livermore with discovering invisible gold at the Standard Mine, because John worked there and probably talked about it as being his first experience with invisible gold, but I know for sure that John first learned about invisible gold by reading Vanderburg's reports. John Livermore brought invisible gold into popularity, shall we say? And everybody in Nevada knows it. Everybody in the mining industry knows it.

And identifies him and you and several others with those early days.

That's right.

Thank you.

DONALD DUNCAN

VICTORIA FORD: *Today is August 3, 1999. My name is Victoria Ford, and I'm here with Don Duncan in his home in Reno. We're going to be talking about his experiences in mining in Nevada. Let's start today with a little bit about your background. Tell me where you were born and raised.*

DONALD DUNCAN: Born and raised in New Brunswick, Canada. A "Canuck", they say.

Tell me a little bit about your educational background.

Well, that won't take too long to address. My alma mater is the Haileybury School of Mines located in Haileybury, Ontario, Canada. This facility dates back to 1912, and it provides technicians for the mining industry, offering non-degreed two and three-year courses.

So the entire college is specifically focused on mining?

Entirely on mining. Some of the graduates, along with their credits from Haileybury, would go on to universities and obtain degrees. However, this was not an election of mine.

How long did you attend?

Well, following World War II, they actually crammed the two year courses into one year to benefit a large influx of returning veterans. I was involved in that specific time period. I think that lasted a year or two.

Were you a returning vet?

No, I wasn't, but I got mixed up with them. There were a few like myself who didn't quite make World War II, but we ended up with the returning veterans.

So you got the benefit of having the course work kind of telescoped into one year?

It was all crammed in to a long one-year course, which actually ran on the weekends,

as well. They had more students at that time than they could accommodate, so this was one way of attempting to accommodate more of them by cramming them into a shorter course.

The curriculum has, of course, changed over the years, considerably, to satisfy a changing universe. At my time, in addition to the traditional classes such as English, math, chemistry, the curriculum included fire assaying, surveying and drafting, geology, mineralogy, and mineral processing.

Was there any one particular area that you focused on, or did you just really take the whole general course work?

No. It's all one. They don't break these down. You have no elections, is what I'm saying. You take classes in all of these subjects. So when you graduate from the school, you have to sort of pick what it is you're most interested in and follow that path.

And get the experience to back up the course work then.

That's correct, and go from there.

Without a degree, do you come out with a title or a certificate of completion of some type?

They call it a diploma.

Was it considered the same as in the United States, which would be like a mining engineer or something like that?

I guess it doesn't equate to a degree course. As I mentioned, some of the graduates went on to obtain degrees, and they got very good credits for the courses they took there at Haileybury. I think that, by and large, some of them might have got a degree after an additional year, but typically, I think

it would be a couple of years to finish the degree. Similar to a junior college situation in the United States.

Once you got your diploma, what did you do from there?

Well, I worked in that general area—Ontario and Quebec—for a few years at underground gold mines where my duties included drafting, surveying, drill core logging. About that time it was evident that there was a trend away from underground mining to surface mining. In order to capitalize on that, I decided to seek employment in open pit copper mines in Arizona. This was in the late 1940s, early 1950s. It was a pretty major shift into large open pit mining. I think this is, by and large, the result of equipment, bigger equipment, where we could mine bigger quantities of rock; and trucks got bigger, dozers got bigger, and they could mine now low-grade, high strip-ratio deposits as opposed to underground mining that just mined the vein-type deposits.

These advances in equipment made the low grade more valuable then. They made it possible to make some money off of that.

It made it possible to mine these low-grade deposits, which prior to that time, weren't economical.

I think a lot of people consider open pit mining to have started in the 1960s, and you're saying that you could see the trend changing as early as the late 1940s, early 1950s.

The trend started changing back in those days, and of course, it has accelerated, but certainly, there's still a place for underground gold mines. As a matter of fact, maybe further on here in our discussions, we'll get into that scenario where there's been a recent

trend into mining underground some of these very high-grade deposits that are down, in some cases, a few thousand feet in depth, beyond the reach of these open pit mines.

And beyond what anybody would have considered in the early days of mining.

Yes, in some large measure. Earlier day mining, underground mines, typically would be a few hundred feet deep. In some cases, of course, they went deeper. Of course, there's been major changes in exploration, and today we're able to discover deep ore bodies, where, in earlier days, we didn't have the drilling techniques. They didn't have the capability of discovering deposits at great depth, because of the advances in drilling.

You were interested in getting some experience, and so you went into the copper industry in Arizona. Was that a good place to get open pit experience?

I'd say that it was a good place, in addition to, perhaps, the iron ore mining in Michigan and Minnesota, which was essentially open pit mining, and that may have been where open pit mining first took off. Arizona began open pit mining, as I mentioned, in the 1940s and on into the 1950s. There were major mining developments in the Southwest, and I got involved, initially, at the Kennecott operation in Ray, Arizona. They were still underground mining when I arrived there, and my first assignment was underground, but they were closing the underground mining and going into open pit mining.

What was your job at Kennecott?

Well, I started as what they call a control engineer. The function of a control engineer was to regulate the grade in this block cave mining method that was being

used there. Block cave mining is somewhat unique, compared to all the other methods of underground mining. They use the term "block" because they mine a large block. These blocks could be as big as a few hundred feet in dimensions, and they're rectangular in shape. They go in and develop underneath an area that they have designed for block cave mining. They develop it on a plane, on a level, with drifts, cross cuts, and then they raise up with short raises, and they drill off these raises for the full lateral extent of this block. They blast that, and they draw the ore, then, down these raises into these lateral openings at the cross cuts and drifts. From there on in, the ore caves by itself. It's a weak ore, and it has to be a rotten rock formation in order to cave properly. Certainly not all ore will cave, in which case, other methods of mining must be employed. The term "block caving"—they use the term "block" because it's a rectangular area, "caving" because the rock falls on its own. There's typically no more blasting required after that initial round of blasting.

Is there some special danger to that since it caves on its own?

Well, the miners are, of course, down out of the way. They're down in these drifts and the draw points. So this ore will cave on its own, and there's actually very little danger to the miners in these cases.

And it's caving somewhere else, and then they're pulling it out of there.

Well, yes, that's right. It's caving upwards, dropping down, and as it drops down, the control engineer regulates the amount of draw, and he samples the material that comes out of these draw points, so they call him a control engineer. Actually, this caving may go all the way to the surface.

But they're pulling off to the sides in the raises and the cross cuts?

Well, they're drawing from this rectangular area, and the caving takes place vertically so that you're really not generating any ore from outside of this block, because, ultimately, you'll step over and cave a block adjoining to this block. You don't want to let one block interfere with the caving of the next block as it's developed.

I guess I'm not understanding how the ore is taken out of there. Is it taken up, like through a shaft, or is it taken laterally?

It's carried laterally with conveyor belts out to a shaft, and then it's hoisted to the surface.

All right. So your job was to regulate the grade and the amount that was coming out of there and so on.

Yes, and the quantity, to control the caving of the block. They attempt to control the caving. They prefer to have the block cave in a uniform, consistent pattern, rather than to have one portion of it cave excessively. They'd like to have the roof of this caving block uniform.

Was this the first time that you had experienced the block caving system?

It was the first time. Block caving is a rather unique method of underground mining. It hasn't been employed extensively, in large measure, because not all ore bodies are conducive to this. It has to be a rock that is very friable and will cave. You have no opportunity, really, of getting into this block and drilling and shooting it. Typically, it tends to be a lower grade ore. It's a very low cost method of mining, but the grade of these deposits, typically, are low.

How did you control it?

We just put a tag on these chutes or draw points. We tag them so that the miners are not allowed to draw from them. That's the method of controlling it. If you block off these draw points as it caves, the cave, ultimately, will reach up to the roof, and then it can't cave anymore. So that's the method of controlling your caving.

Ultimately, when it hits the roof, that's the control, right?

That's the control. Typically one area will want to cave better than another. So the miners, in order to get production, will want to draw too much from one area, so we close certain areas off and not allow them to draw there, so they'll go back to these areas that don't cave as well or as fast, in order to keep that block uniformly caving, so that it doesn't funnel up through the surface. In some cases, if you funnel up, you may enter into an area that you don't want to be in. It's not ore, or it's too low grade. It's a little difficult explaining this, but you're able to somewhat determine where you're doing the mining. So if there's an area that you know is low grade—it's been predetermined that this portion of the block is not as good a grade as another portion—you do have some control over it.

So that was your first job, but then they were closing the underground.

They closed the underground, and they decided to go into a largely open pit operation. The mining was contracted at that time to a Reno company. They did the initial mining for a period of a few years. I was involved then in the engineering element, mainly in surveying.

Surveying to locate where the open pit was going to be?

Yes, and measuring the quantity of material that was moved by the contractor.

So you worked with the people from the Reno company?

Well, we worked for the mine operation, Kennecott, but the contractor did the mining, and we had to measure the amount of material that he mined.

What did you think of your first experience with open pit?

Well, I thought it was something that was a coming thing, and I wanted to get involved with it. At that time, of course, I was involved in the engineering aspect of it, not the operations end of it. Ultimately, I got into production operations, as well, but that came a little later on. I left that operation and went to another one in the same general area, in Globe, Arizona. Then along came the Korean War and the draft call and service. I did service in the U.S. Army in an airborne unit. I didn't make it overseas, fortunately. In 1955, following discharge, I got into a whole different scenario. I went into mineral exploration work. A friend of mine, a geologist, had talked me into taking on a field supervision job, actually, back in eastern Canada where I hailed from. We were looking for base metal deposits there, and the company also had a program of exploration for natural gas in southern Quebec. That program with that company ended, and I was somewhat relieved, because I felt it was really not a part of my overall plan.

Exploration was not really the direction you wanted to go?

It's not the direction I wanted to go in, although I think that experience later on proved to be beneficial. I wanted to get experience in production operations, open pit production operations, in order to advance

my career. It was a little hard for me to break into, because my background had been essentially in engineering. After an extended search, I found employment with the Iron Ore Company of Canada as a pit foreman at a new open pit operation in northern Quebec and Labrador.

The pit foreman actually ran a shift in one specific pit. He was in charge of the shift and all the equipment: shovels, trucks, drills, blasting, whatever the mining entailed. At that time, this was a large project. As a matter of fact, the project boasted the largest capital outlay of any mining venture in the world. It involved most of the large iron ore steel companies of North America. We had something in the order of five, six, seven pits operating, and they had a total of fifty-some pit foremen to operate all these pits. I was one of about fifty-one, fifty-two, something of that order. We reported to a pit superintendent. The pit superintendent then had overall responsibility for one pit out of the seven. We did shift work. These pits operated around the clock seven days a week. We would rotate. These pits were also involved in rail transportation. In some cases, the railroad would run right into the pit, and we'd load directly into the rail cars. In other cases, the ore would be trucked out of the pit into crushing facilities, and the ore would be conveyed into rail cars and transported by railroad.

How was this for you, just breaking into production, to go right into a supervisory position? Did you have any difficulty with that and learning what you needed to know to supervise people?

Well, there was lots to learn in my case. I think that this was a large operation, and the reason that someone with little background in that type of an operation could break into it, was the fact that there was a lack of people qualified, and they had to pick up whoever they could. [laughter] As a mat-

ter of fact, we did extensive training. We took classes to become experienced in drilling, blasting, loading operations. We actually were responsible for training employees. We had to supervise not just the operations, but we had to have ongoing training operations in the open pits. We'd have employees who had no background in mining. We had to make drillers out of them, we had to make blasters out of them, truck drivers, shovel operators, dozer operators, et cetera. So we had to be pretty proficient ourselves, and we became that through classes and training. It was an excellent opportunity to break into operations. Of course, after four years of living in arctic weather conditions, I was ready for something different.

This was in the sub-arctic. The town was called Schefferville, and it was a terminus with a 360-mile railroad that ran south to a port called Seven Islands (Sept-Îles) where the ore was shipped from there all over the world. We were in a very remote location. The town of Schefferville had a population of about 7,000. It was strictly a mining community.

We were dealing with temperatures down to sixty below, and occasionally then some, and a strange weather condition there was the winds. The colder it got, the higher the wind blew. We were open pit mining, and some of the work was done in the open—like the blasting operations. You were housed in a truck cab or a shovel cab, and sometimes these people could only work for two, three minutes, and then they had to get in a piece of equipment to get out of that wind. Being exposed to that kind of temperature and wind, you're susceptible to freezing your face; your nose would be frozen. The clothes we wore were something else, but even the equipment, the shovels, for instance, had to be kept operating twenty-four hours a day. If not, why, the metal would become so brittle that it would snap. If you started up a shovel that hadn't been operating, and you put the bucket into the bank, then you'd be

taking a chance that the brittleness of the metal would cause the bucket to break or the boom to break on the shovel. As long as that shovel, however, kept working, there would be a certain amount of heat generated within the metal to keep it warmed up to some degree to the extent that it wouldn't snap, but frequently it would happen in any event. Occasionally, truck engines would freeze up, and you would lose an engine, which happened quite frequently, so that it was a very trying situation. The position the company took was that weather wasn't going to stop the operations. They had to operate twelve months of the year, and they did, despite the cold.

And there was cold twelve months of the year?

Oh, no. The summertime was reasonably reasonable. Although we did see snow twelve months of the year, but the summers were entirely different. We got some warm weather in the summer. The problem of the summer was the black flies and mosquitoes. We had that problem.

You said that you were isolated there. Describe where it is located.

Well, the nearest settlement was the terminus of the railroad, which was 360 miles to the south. There were absolutely no towns. The company had to construct this railroad which, again, was a major project. As the railroad built north they, of course, moved the construction equipment up the railroad and constructed a portion of the railroad. They did build some landing strips and flew equipment in. Ultimately, they had a fleet of thirty, forty aircraft, which were aircraft that came out of World War II, but there were no towns whatsoever. There were no Indian settlements that I can recall. All major equipment went in over the railroad. Ultimately, we got a commercial airline ser-

vice in there, and the company maintained service, as well, with their own aircraft.

You mentioned that Schefferville had a population of about 7,000. What were the accommodations? Did you have your family there with you?

Yes, we had the family. We had good housing. We had a company hotel; we had one grocery store; and we had two, three churches. The Canadian government ended up putting in one of these radar early warning sites. That was probably the only other facility other than the company-owned facilities in the area. I'm not sure what they call that particular radar. They had three radar sites. There was one called the Dewline. There was one north of here. This was a middle one, and we had a further one on south, stretched all the way across Canada. These sites were all manned in those days, because we were right in the Cold War.

So after the cold and isolation, you had learned something about open pit mining, but you were ready for a change?

Well, I was what you considered, after four years of that, pretty much an expert in open pit mining. Then there were a lot of greener pastures. I had promised myself three years there, and I lasted four years. So I moved out after the fourth year, and there was a new copper operation in southern British Columbia called the Craigmont Mine. It was one of the Placer—which is now called Placer Dome—one of their new operations. It was located, again, in southern British Columbia, and I was employed there as a pit foreman. The operation was quite similar, other than the fact it was copper ore rather than iron ore. I spent a short stint there as a pit engineer. Due to a medical problem I had, a back problem, I had to get out of the operations for a while, and into

the office. So they gave me an engineering function to perform, a pit engineer's job.

Did you want to stay in the engineering, or did you want to get back to operations?

No, I didn't really want the engineering, but it was sort of a benefit. I couldn't handle the work in the pit at that time. I was recuperating from an operation.

Was the back problem related to your work?

Well, it was related, yes, to earlier work. Not at that site.

After five years at Craigmont, I was transferred to a coal operation in Alaska that the company operated. I went there as chief engineer, and subsequent to that, I became assistant superintendent. Again, this was another open, or strip, mine. I was there for a couple of years and was transferred from there to Nevada to what would become Cortez Gold Mines, still with the Placer Dome Company.

Initially, they were exploring the deposit and anticipating that it would go into production, and it did. After I was there for several months, they made a production decision. Of course, I was the manager and remained in that capacity for nine years until the ore reserves ran out. At that time, I had accumulated seventeen years of service with Placer.

So tell me a little bit about being manager of the Placer gold mine. Was this an open pit operation already when you arrived?

No, this was strictly an exploration drilling project when I arrived, but the deposit had been pretty well defined, and it was a matter of going through feasibility studies in order to determine whether it would be profitable or not.

I arrived there in 1967. We got a production decision in March of 1968, and we went through a plant construction phase and were actually producing gold in December of 1968. We were up and running in nine months, which is, of course, unheard of these days. These days, you're talking about in some cases, several years for permitting purposes. In those days, there was no permitting.

The conceptual design for the plant was done by Bechtel of San Francisco, and it was constructed by a construction company that Placer had used previously. It was done with union labor. Incidentally, this was about four years after the construction of Newmont's Carlin Gold plant. It was in op-

eration already. This was the second of, you might say, the new gold plants at Carlin. If you want to call Carlin the number one, Cortez was number two. Of course, we've seen any number of these gold mining plants go up since then.

Was any of the technology that you used in constructing the plant at Cortez similar to what was going on at Carlin?

Basically, it was the same process, yes. Matter of fact, I believe Bechtel did the conceptual design for the Carlin plant as well, so the process was similar, except that Placer had quite a development department with a lot of expertise and process design work, and



"The conceptual design for the plant was done by Bechtel of San Francisco." An aerial view of the Cortez Mine with the pits at top left, the plant at top right, and the heap leach operation at the bottom.

they incorporated a lot of their own ideas into the design of the plant.

There were some innovative design functions, mainly to save capital costs. I think they took the Bechtel design, and they said, "Well, we can save money here, there." But nothing materially different. The only area that I can really remember that saved considerable money had to do with the design of the CCD circuit, which was the thickeners, the five-thickener washing circuit in the detail of the underflow. The old system had been to build tunnels underneath the thickener. The pulp comes out of the thickener in the center of the tank, the bottom of the tank. In order to provide access to that point, the conventional method was to build a tunnel underneath the thickener. Placer came up with the concept of doing away with the tunnel and using strictly a pipe. As a matter of fact, in addition to the large pipe that withdrew the pulp from the bottom of the tank, they put in air and water lines in order to facilitate the thickener, which is always prone, during power outages particularly, to plugging up. The pulp would settle down, thicken, and you lost the function of the thickener. By injecting air and water in at that point, you'd agitate the pulp, and you'd get the thickener to function again, operate. So that was one design feature, I think, that saved considerable money.

Other than that, it was a pretty conventional type of gold plant. Again, it had this CCD, "counter current decantation," series of washing thickeners, and the solution that came from this thickener circuit, the pregnant gold solution, was processed with zinc using the zinc precipitation process. Gold was recovered in plate and frame filter presses. These filter presses, of course, were periodically—once a week, more or less—opened up, and the gold precipitate was cleaned out of the presses, and it was fluxed and fire refined on site. It was a process that was pretty conventional, and used prior to that, and it's still used today.

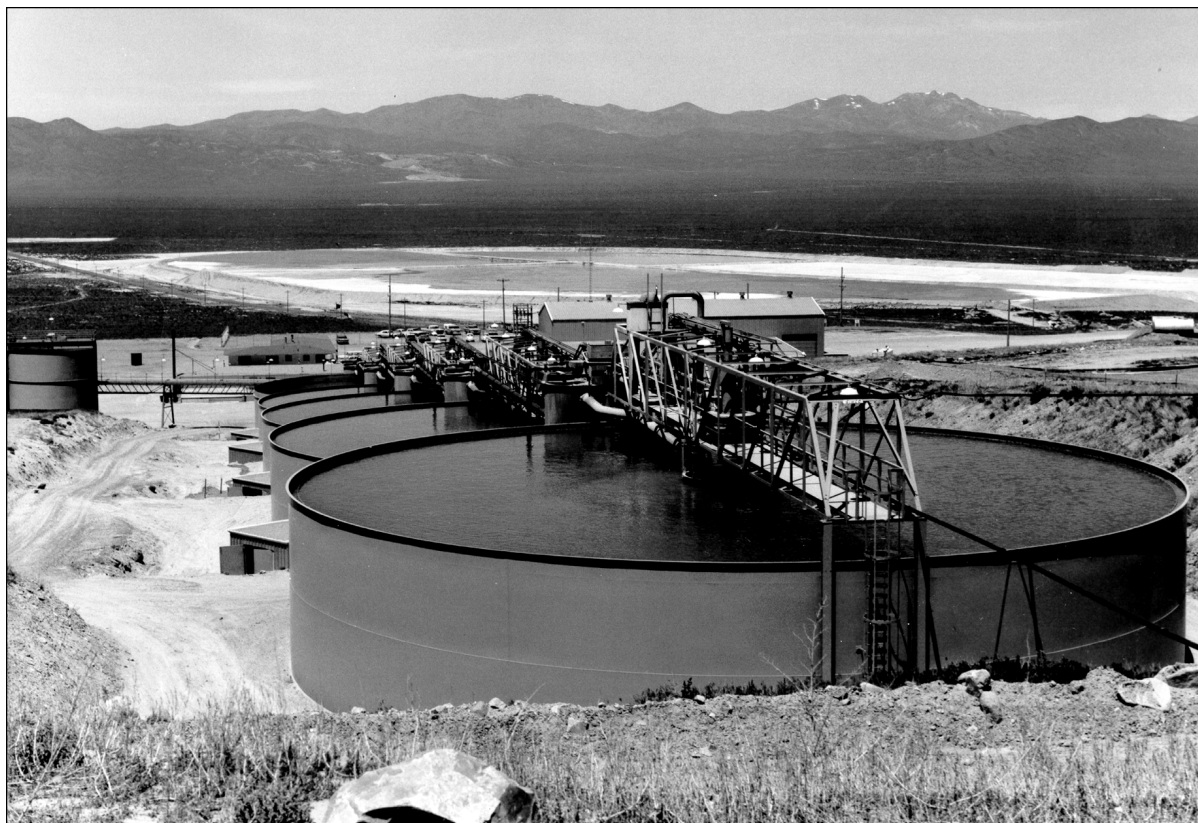
Did it change over the time that you were there, or once the plant was built, did it stay pretty much the same throughout that time?

The plant stayed pretty much the same. The only major change in the processing had to do with introduction to heap leaching. We'd take low-grade ore that was not economical to run through the mill, and we processed it by heap leaching. The heap leaching was brand new technology. Commercial-scale heap leaching actually started at Cortez. This was where it began. This was the first site where we actually went into large-scale commercial heap leaching.

The Bureau of Mines research facility in Salt Lake City had a program. They conceived the concept of heap leaching for gold ore. It had been, to some minor extent, used in the uranium industry, and they elected to attempt to leach crushed ore in their facility on a very small scale, pilot scale work. They reported the results as they went through this testing program, and they actually concluded, using different ores, that they could recover sufficient gold to make this economical. It would depend on the fact that certain ores, of course, leach better than others. Some ores wouldn't leach at all. It depended on the mineralogy of the ore. Some ores would require finer crushing than others, and this experimental work was directed to determine just what size might be economical to crush to, and, in fact, if you could heap leach run-of-mine ore. It was at Cortez that we actually went to run-of-mine-size ore for our initial heap leaching.

Run-of-mine would be anything up to, typically, say, three feet in size. It would depend upon the nature of the ore body, how it responded to blasting. In some cases, the ore would be finer; in some cases, it would be pretty coarse.

The ore that we had—we actually had stockpiled about a million tons of low-grade ore when we did start doing our own pilot



Five tanks in the CCD thickener circuit.

scale tests, which determined what we could do with this run-of-mine ore that we had stockpiled. The test work indicated that the economics would be favorable. So then we created these impervious leach pads, removed the ore from the stockpile onto the impervious pads, which we constructed from either tailings or from locally mined clay deposits, and we sprayed the ore with sprinklers—the Rainbird sprinklers.

So then we collected the solution into a collecting pond, and in this particular case, this solution went to the mill for processing, but we didn't have to provide any kind of a new recovery circuit. We already had the recovery circuit, and we had the capacity to treat the extra solution we generated from the heap leaching.

So you started out with pilot testing projects?

Pilot scale. Of course, testing, yes, was on a larger scale than in the bureau tests.

How did you learn about this from the bureau? I mean, were there bulletins being put out, or did you have contact with some specific people?

Well, the bureau made contact with us, of course. They were working on gold ores, and we probably provided them with some of the ore that they used for testing. We maintained close liaison with them, and they were putting out periodic bulletins on, if not a monthly, certainly a quarterly basis. We were surprised at what they were doing, and we felt that it had potential, and it surely did.

And when you say "we," what was the structure within mine management that

made the decision? Was it a decision that you made on your own, or were there a number of people involved in this?

It was a management committee. Cortez Gold Mines was a joint venture, and it had a management committee made up of the venture partners. These venture partners would be typically at the mine site a couple times a year, and we would bring forth our recommendations on such things as the heap leaching and whatever. They would provide approval for our recommendation.

You were the manager, so you put those decisions into operation at that point. Was this an exciting time for you to be at the front of some brand new technology?

It was very exciting. Yes, it was very exciting. We had the opportunity, in addition to the routine operations there, to consult on projects that the venture partners would be looking at. One of the partners was the Bunker Hill Mining Company, and, of course, there was the operating partner, Placer. Well, any time they needed expertise that we had available, then they would call on us, and we'd provide whatever services we could, either myself or members of the staff. So we followed some of the new mining developments in Nevada, particularly.

This whole process was still in somewhat of the experimental stage. Do you remember any of the adjustments or changes that you had to make to it in order to make it effective and efficient and profitable?

One of the things that the bureau worked on in this heap leaching venture, in addition to the leaching element, was the recovery element, and they picked up on an old process using activated carbon to recover gold from pregnant solution. It was called the Zadra Process. This fellow, Zadra, had

worked for the Bureau of Mines, and this goes back, probably to the 1920s or 1930s when Zadra was actually using activated carbon to recover gold. He did that experimental work. As I understand, he did it at the Getchell Mine, but it never caught on. It was never utilized until the bureau decided that they would attempt to recover gold with activated carbon, and then strip the gold from the carbon. This required work that went further than Zadra did to actually put it in a category where you could commercialize it. So they further developed the Zadra process, and we, of course, picked up on that, as well.

Subsequent to the initiation of heap leaching at Cortez, we discovered reserves across the valley from the Cortez operation at the former Gold Acres mining operation where, in addition to developing and then, subsequently, mining and milling some ore there, we also mined low-grade heap leach ore, heap leached at the Gold Acres site, and had to build a recovery plant there. So we used the new process of activated carbon and stripping of the carbon at that small plant. We stripped under pressure and temperature, and then we recovered the gold from the high-grade strip solution.



You mentioned that union labor was used to construct the plant at the Cortez Mine. I'd like to have you discuss a little bit with me about your experience with that. Maybe you could start with how the decision was made to use union labor.

Well, the project manager, who was not resident at the mine site, had a background predominantly with trade unions and union operations. He felt that it was probably going to be more problems trying to go non-union than there would be by going union. So it was his decision, and we elected to make an agreement with the trade unions.

Was this project manager located right at the mine, or was he at headquarters?

No, he was strictly at headquarters, and he would visit the project perhaps on a monthly basis. I worked, of course, closely with him. I was manager of the operation, but he actually called the shots on the construction.

And he felt like there would be fewer problems by putting union labor in charge of that construction. And how did it actually go? Give me some examples of how that actually worked.

Well, productivity was really pretty bad. At any one time, you could look around the site—and we had something like 125 construction workers on the job—and if you could find ten or twelve of them working at any one time, that was probably the best you could do. The rest of them were sitting around, or they were hiding, or they were off goofing off somewhere. So, number one, productivity was poor, but I would say that on the plus side, these people generally knew how to get the job done, and you had qualified people. So on the plus side, you had assurance that you were going to get sufficient qualified people to get the job done, but productivity—you paid for it, of course, in productivity. Some of them, of course, were better than others. Some of them believed that they shouldn't do a day's work, but by and large, that wasn't the case.

What were some examples of things that went on instead of work?

Well, for one thing, they had this ladder game, and typically, there was always someone walking around with a ladder over his shoulder, and the nature of the game was to see how long he could carry this ladder before some supervisor would pick up on it and

tell him that was long enough, get back to work. It was just a game that they were playing.

What else went on there?

Well, there was hostility within the construction workers, and they packed weapons into the site, and, of course, that was one thing that certainly, I don't think, was to be condoned by the general contractor, but the weapons were there not only on the site, but in the bar and down at the trailer park in the little town of Crescent Valley. There was a trailer park facility at Crescent Valley prior to the park that was developed by the company. Ultimately, Cortez developed their own trailer park for their operating people. I lived in the privately owned trailer park prior to the time we completed housing in the town of Carlin. Of course, it was a mixture of a few key Cortez Gold employees and some construction workers. A lot of rowdy-ism, and a lot of drinking going on.

They would parade in the morning. [laughter] Prior to these fellows going to work in the morning, they'd be packing six-packs of beer around and displaying them very openly so that they made sure that I could see it. Again, that's just another game to intimidate you, I guess, in some way.

There was an event that took place in the bar. I wasn't there to witness it, but a small contractor, who I had employed to do some work that was outlying, that wasn't right on the site, had a couple or two or three employees there. On one occasion at the bar, one evening, one of the union fellows who was openly packing a revolver was trying to pick a fight with him. The bar was loaded up with, of course, mainly union people, and they were down on the small contractor because he was non-union. They were out to do him in. He had a young fellow with him sitting at the bar, and he got word to him to get out to his camper and bring a revolver

with him that he had in the camper. Well, the young fellow got out, brought the revolver in, unnoticed to the union people, and at the moment when it looked like the fight was about ready to take off, why, the small contractor whipped his revolver out, and he backed out of the facility and warned them that the first fellow that moved towards him was going to get shot. So I guess that was probably the last time the contractor hung around the bar.

He meant it. He was very serious about it. You know, it was a case where some of the union people were packing weapons, so there was only one way to protect yourself. There were no police facilities or protection in the area, so you had to look after yourself. It was the Wild West, absolutely.

Was there ever any confrontation like that on the work site with the guns?

No, I wouldn't say that it went that far on the job site, but there were certainly occasions when the animosity between the union people and construction workers on the site called for the contractor or the supervisors to intervene and take care of the problem. Oh, it was a pretty tenuous situation throughout the project.

Were they just there for the construction of the mill, and then the union was gone after that? Or did they remain after then?

No, they all left. None of them would have stayed. It was only for the construction. I might add that I believe this may have been the last mining construction job that was done by union labor in Nevada.

You said later there was some unionizing at the Cortez operation?

Yes. The operating engineers petitioned for a vote, and the operation became union-

ized, and it remained that way pretty much throughout the operation, but towards the very end, the employees elected to do away with the union.

Did you have the same experience with the operating engineers union?

No, we had pretty good relations with the operating engineers. It wasn't the same scenario at all. There were some aggravations here and there, but when the union people, I guess, decided that the management really was a good management—and it took time for that to develop—ultimately, the union fellows at the site took the position that, "Why have a union? We really don't need one."

What did you learn about working with the union when they were there constructing the mill? What was the best way to work with them?

Well, there had to be a lot of giving, I guess, on management's part. You know, they could shut you down at a moment's notice, create all kinds of problems. So you pretty much had to cater to their actions and go along with it. If you didn't, why, you'd end up in bigger problems.

It was my first experience working with the trade unions. I had prior experience working with, like, operating engineers, steel workers, mine mill smelter workers. This was entirely different. I can't say that in another state it would have been this bad. It might not have been at all. This was a Reno local, or locals, that we were involved with. I think it probably was a case where it was one of the worst in the country. I would have to think that.

Did you ever have an idea about why it was the worst in the country? For example, was it the fact that it was so far out there, and there was very little law enforcement?

I can't really address that, Vikki. I had no prior experience of that nature, and I had no experience subsequent to that. I do know that those trade unions fell by the wayside, and I'd have to think that they themselves contributed to that.

I'm going to just kind of turn this over to you and let you start describing to me how that heap leach process came to be at the Cortez plant and what your experience with that was.

Well, I've done a little research into what transpired, by going back to some old notes of mine. The pilot scale testing for heap leaching began at the site in 1969. We went on from there right into commercial, run-of-mine leaching, processing a total of four million tons which had an average grade of .04 ounces per ton. The gold recoveries typically ranged somewhere between 60 and 70 percent, which would be achieved over a period of about ninety days.

This would have been considered low-grade ore, then, at .04 ounces per ton?

Yes, the cut-off grade at that time between heap leaching and milling was .08 ounces. So any ore that ran below .08 ounces was processed by heap leaching. I think the lower cut-off grade was in the area of .02 ounces per ton.

The 60 to 70 percent recovery—was that a good recovery rate for this low-grade ore at that time?

Well, I think it's a good recovery considering that this is run-of-mine leaching. A lot of the mines today that are in the leaching process will crush their ore, and they can typically achieve, maybe, somewhat higher gold recoveries than what we did at 60 to 70 percent, but at the cost of some crushing,

and the crushing size, of course, will vary according to the nature of the ore.

So you went from the pilot scale testing to the commercial operation in fairly short time?

Fairly short time. My notes didn't really pick up on the beginning of the commercial leaching, but I know that throughout 1969, actually, we were testing on the basis of several thousands of tons, and from there, we just could see the benefits of the money to be made in heap leaching and went right on into it. I would think that was in 1970 that we were actually getting into commercial scale leaching.

As we were depleting the reserves at the Cortez site, we acquired a property called Gold Acres, which was eight miles across Crescent Valley from our side of the valley. We drill defined some reserves at the old site, Gold Acres site, and could see that in addition to some milling ore, we also had some heap leach ore. So we ended up trucking the milling ore, the higher-grade ore, to the mill with 100-ton or 120-ton trucks, and the heap leaching commenced with a new facility that required a gold recovery plant. We elected to go with carbon absorption, utilizing five carbon absorption tanks. This was followed with pressure stripping of the carbon at seventy-five pounds pressure, which generated a temperature of about 250 degrees Fahrenheit. The pregnant strip solution was processed through an electrolytic tank. At that time there were no off-the-shelf, suitable electrolytic tanks available. We had to design and construct one on our own. Gold was recovered on steel wool cathodes. Initially, we were using stainless steel wool. We subsequently determined that mild steel wool was a better way to go.

So that was one of the accommodations that you had to make, to make this work?

Yes. The carbon required regeneration in order to activate it, and this was done thermally in an indirect fired rotary kiln, which we were able to buy used. It originally came out of a plant in Florence, Colorado, that regenerated carbon that was loaded with gold at the Cripple Creek operation. It was the Carlton Mill in the Cripple Creek district. This was a custom mill that had several different types of processes, one of which was carbon absorption, and this was a small rotary kiln that was used to regenerate the carbon.

One unique element of this plant was that it was essentially unmanned, except for some periodic carbon advancement, chemical makeup, and gold clean-up work. The essential functions were monitored at the Cortez Mill eight miles away, via signals from a buried cable.

The cable was just like TV or telephone cable?

Yes, it would be a cable with more than one conductor, several conductors, and the cable was buried. As you see today, they're burying cables with a bulldozer and an attachment on the back-end where they rip into the ground, and the cable plays out on a reel from the bulldozer, and so it's buried two, three feet underground. And that would stretch across eight miles over to the Cortez Mill. We could monitor the pumps, whether they were running or weren't running, and different elements of a plant were connected up to this cable. We had a read-out facility there in the Cortez Mill. I believe we also had security tied into that network as well.

It was a remote operation. The only people there would be there during the daytime. They'd go over there, and they would make up chemical reagents and take care of electrolytic cells and whatever had to be done. Usually, it might have been a two, three-hour job, and otherwise the facility was

locked up and was monitored from the Cortez Mill.

Is that the first time that you had worked with a remote-control operation like that?

Yes, first one that I was aware of. I got the concept from a uranium plant. Instead of using carbon, they used resins in these tanks, and they would contact low-grade, uranium-bearing solutions to resin in these tanks or columns. The only attention they needed was periodic removal of the carbon or the resins. The resins would be put in another tank and stripped, or they could be stripped of the uranium in the same tank. That could be done. I could see that it required very little attention, and so I got the idea from that. I also recognized that we would periodically have outages, and we would have voltage fluctuations in our power supply, which would trip motors out. Without being able to monitor these pumps, it could be out of service, and you wouldn't know it unless you could do this remote monitoring. So, yes, I think it was something that was pretty new.

This was a part of the heap leaching process at the Gold Acres location?

This was the leaching facility at Gold Acres, where we ended up processing two million tons. Two million tons of heap leach ore, and approximately two million tons of milling ore that was trucked to the Cortez Mill.

Now when you were starting this heap leach process, you mentioned that it came from the U.S. Bureau of Mines research. Would you describe a little bit about how you found that information and how you started working with the U.S. Bureau of Mines?

The bureau in Salt Lake City—they have a fine facility, a substantial research facility. They also have one in Reno, or they did have one in Reno. I think it was an outcome of research on uranium ores. Towards the end of the uranium-mining period, the bureau, again, got involved with heap leaching uranium ore. I can only recall one operation, a commercial operation, that actually heap leached uranium ore. So I say that it was towards the end of the construction of the uranium plants when it was decided that some of these uranium ores would be heap leached. Again, it was a pretty innovative and major event in uranium processing. I think that this led the bureau into doing some research work on gold ores. So they developed a program and got it funded. They were pilot scale testing different ores on the floor of this facility in Salt Lake and putting out periodic reports every two or three months. They'd put out a research report which would describe the results. We were getting information in that manner, and we were following their work. At the same time, we were stockpiling this low-grade ore. I would imagine that the bureau, no doubt, had done some work with our ore. About the same time, we got into the program ourselves of doing pilot scale tests.

You worked with the U.S. Bureau of Mines out of Salt Lake City. Were there some key people that you worked with who had been working on the research for this heap leaching process?

Well, there were two individuals: Harris Salisbury and George Potter. Joe Rosenbaum was the manager of the facility, and Joe had a great background with uranium and leaching and developing processes that went back throughout the history of the development of uranium processing. During these days, of course, the uranium industry was still a very major mining business, but here, now,

the price of gold was escalating, and there was activity. People were beginning to explore for gold, so it led the bureau to get into gold research. Heap leaching was one of their first projects to take on with respect to gold.

We worked very closely with them, and we monitored on site their apparatus. In addition to their heap leaching, they were also advancing the carbon absorption process. So, although the carbon absorption process had been known and had been used somewhat, these people could see that there was room for improvement in process through different means: multi-stage columns and multi-stage tanks. I believe they also may have been doing some electrolytic recovery work, as well.

So both processes were being researched by the Bureau of Mines—the carbon absorption and the heap leaching—concurrently?

Definitely. As they ran these leach tests, they were taking the pregnant solution, and they were contacting with carbon using different methods. They were also working with carbon regeneration. As I recall now, yes, they were in fact trying to develop new techniques for electrolysis.

So all of this looked very promising for the low-grade stockpiles that you had?

Looked very promising, and we were getting ourselves involved at the same time in doing research and testing, and doing it on a pretty substantial scale.

More of a commercial scale than what the Bureau of Mines could do?

Yes. They were doing it with probably little piles about the size of this desk, whereas we were doing it on a scale of several hundred tons, and then followed by several thousands of tons. If I remember the

figure tests that we did prior to commercial leaching, we were doing it on a catalytically blown asphalt pad.

What is that?

That's a good question. [laughter] This was an asphalt product that came in in tanker trucks, and it came in heated at pretty substantial temperature. It was a liquid. You prepared a surface where you wanted to do the leaching, and the truck would come by, and it would pump so it sprayed this liquid asphalt on the ground, and it would make several passes. Soon as it hit the ground, it would harden, and they'd build up a layer, oh, perhaps an inch, maybe as much as two inches thick. And they called it catalytically blown for whatever reason. This product came from out of state somewhere. As I recall, I think it might have come out of Washington state. It was trucked in several truckloads, and it was just another approach to building an impervious pad. The cost of that, I think, just probably ruled it out, eventually. With commercial leaching, we developed our own clay-lined pads. From there, why, the industry picked up on plastic—PVC, various plastic-like products that manufacturers put out in sheet form. The polyvinyl chloride is being used these days. Also what they call low density and high-density PVC products. Then in the early days, we also used some butyl rubber, which the ranchers were using in those days to line our ditches, ditches that conveyed the solution from the heaps into a pond, and the butyl rubber worked very well. Butyl rubber, I think, today is a little more expensive than the plastic is, so it hasn't been used extensively.

It's interesting to hear what was tried in the beginning to line the leach pads. What other things were tried in the beginning as you were moving from experimental to commercial production?

The application of solution was one of them. We initially, I think, picked up on Rainbird-type sprinklers, the impact Rainbird sprinklers, but today they use different types of sprinklers, too. That's varied over the years, and today I think the drip system is used as opposed to a sprinkler.

So it's not blowing out into the air.

Not blown out in the air, and the advantage there being that solution can get a lot of evaporation losses, particularly in the summer in using those methods. With the drip system you get much less evaporation loss. There would be days in the summer when you'd get a hot day, and the wind was blowing. You had to stop spraying, because it would all evaporate. You lost all your reagents; you lost all your water.

Do you recall any other challenges that you faced in moving this from the experimental to the commercial level?

Well, yes, we tried different things. Like we actually buried some of our solution lines. These would be perforated pipe, and the object there being to get around the winter freezing problems we encountered with the sprinklers. The sprinklers would generate big ice fields in your heap during the winters so that you got very little solution that was actually trickling down through the heap; you ended up with an ice field. To help that problem, why, you'd probably just leach during the daytime—the temperature came up to about freezing—and then shut down at night. With the drip system today, you can operate in pretty cold weather without generating an ice field.

So we did research testing in those areas. We also found problems with the run-of-mine leaching. Some of the ores would have problems with percolation in the heaps. As the solution percolated down through the heap, it would tend to wash with

it the fines, and these fines would end up hanging up at some point in the heap, perhaps where you encountered an area of finer material, finer rock. The fines would hang up, and it would form sort of an umbrella, and subsequently, solutions that percolated down and hit this umbrella, or impervious area, would have to migrate around it, and you'd end up with areas of the heap that weren't in contact with solution—that didn't leach. You actually had to go back in and re-mine the heap and stack it all over again. So, for run-of-mine leaching, I think this is something that should be kept in mind, that that problem cropped up with some characteristics, some ores.

Is that a problem that's resolved with the crushing in some of the mines, where they crush it first and then stack it?

Yes, I don't know that we've ever recognized problems with crushed ore of that nature. The other percolation problems that we've encountered have to do with clay minerals in the ore. And these clay minerals may just preclude percolation. To solve that problem, it's done through agglomeration. Some ores have to be agglomerated with, typically, Portland cement. The Portland cement will set up the fine particles to such an extent that they don't migrate and seal up the heap, creating percolation problems. You lightly cement this crushed ore, and that will generally solve most of those problems. Some ores are just loaded with clay.

Do you recall any other experiments at Cortez? No doubt you came across more challenges as you moved on to different jobs and locations, but I wanted to make sure we covered everything at the Cortez Mine before we moved on.

Well, I think there have been a lot of changes made in transporting solutions on

the pad itself. If the solution has gone down through the heaps and contacted the pad, in some instances where we use clay pads, we incur erosion of the clay. The solution would channel certain areas and would gouge out the clay and could create a channel, and you would actually erode away your pad. So that was a problem in some cases. I think that with the plastic liners you wouldn't see that problem.

You said you did use the clay-lined pads, then, at Cortez after this?

It was either clay-lined pads or tailings-lined pads.

So this catalytically blown asphalt pad, that was one time only?

That was one time.

Was it because of the cost?

Cost.

How effective were the clay-lined pads and the tailings-lined pads in keeping the solution and everything above ground? Were you losing some into the ground water?

No. The clay-lined pads would be tested in a lab. We'd contract that out to a soils engineer, and the lab would compact that and determine the optimum moisture content for the compaction, and then they'd run percolation tests. The percolation tests would tell us whether it was suitable or not suitable and how thick to make the clay-lined pad. So it was all engineered. They knew exactly what the percolation rate was for given compaction of a specific clay type. Or, in some cases, they were used tailings, and that gave us assurance that we weren't going to have leakage of solution down through the pad.

One of the reasons that today you see more plastic-lined pads is still the fact that there is not always suitable clay available in the area, but we could create a pad with clay generally cheaper, providing it was within a hauling distance of two, three miles. We could do it cheaper than putting a plastic pad down.

Do you think that some of the environmental regulations have had an influence on whether clay-lining or plastic lining is used now?

Oh, yes. The permitting people—if you say one plastic liner is sufficient—they say, “Well, let’s go to two. That way we’ll have additional protection.” Or in some cases, they may even require you to have three different plastic liners. It’s possible to puncture these liners laying them. Generally speaking, they’ve gone to two liners rather than the one. Then on some occasions, they’ll put down a type of membrane on top of the plastic in order to protect it from puncturing by the ore. Or they’ll lay out a gravel bed on top of the plastic liner or use fine crushed ore for protecting that liner.

One of the things that you mentioned at this time was that Newmont was near to where you were working, and that they had a manager who was a friend of yours, and he had a different perspective on the value of the heap leach process. Would you talk about that just a little bit as part of the history of how this all got started and where.

Well, at the Newmont operation, as well as the Cortez operation, the bulk of the ore was, as we knew it, high enough grade that it required a mill. The profit was in the milling. The profit wouldn’t be in the heap leaching. I would say at Cortez that that was certainly the case, but the heap leaching probably enhanced profitability by a factor

of as much as 20 percent, which is significant. The Newmont operation, again, was treating an ore grade that was at least equal to ours, and the bulk of their profit was going to come from milling, not heap leaching. They didn’t really look at heap leaching as either a viable alternative or ancillary method of processing, so they just didn’t do it, except on a very minor, pilot-scale effort, and it wasn’t until the development of their Maggie Creek operation, which came several years later, that they commercially heap leached. Maggie Creek was a low-grade operation, and I believe it was entirely heap leaching. If it wasn’t entirely heap leaching, there was very little milling ore in it.

That was some years after you had already got the Cortez heap leach?

This was several years later. They certainly recognized the potential at that time.

You mentioned a friend of yours, Jay McBeth who was the manager. Did you two talk about the heap leach process?

Yes, we did. And other Newmont people, of course, visited our operations and recognized that it certainly was a process to use for what we call sub-marginal ore that you couldn’t process through a mill, and when their day came, why, they put it to good use.

Would you describe the relationship between Newmont and Cortez as competitive or cooperative?

It was cooperative. Entirely cooperative.

Everybody was trying to help each other find new ways?

To help each other, yes. Absolutely. We visited one another’s operations and picked up ideas from one another.

Has that changed over time? Were the mines still operating cooperatively when you were last involved with them?

Well, I haven't been involved for the last dozen years or so, but I would think that, yes, they are still very cooperative in that sense, that they help one another, and they work with one another on different matters relevant to processing and equipment. Today we're blessed with all kinds of electronic gadgetry that monitors operations throughout the plants, and there's new equipment coming on the market. As that happens, why, there's always an opportunity to exchange ideas. By and large, the mining industry has been that way. I mean, that's pretty typical of the mining industry. Not so, the chemical industry. The chemical industry is very secretive; it's very difficult to get a visit in someone else's chemical plant. More of a competitive world, whereas mining, certainly gold mining—marketing isn't a problem. It isn't the same problem as the chemical industry has.

Was there anything more that happened at Cortez that you wanted to talk about in terms of the early days and the heap leach process?

No, not other than that we had a lot of people interested in the process, and we conducted a lot of tours. Some of the general public would stop in and seek tours, but other mining people certainly made an awful lot of visits. It's always disruptive. You can't get away from it. Typically you don't provide additional people for that purpose, so when someone requests a tour or the head office calls up and says that so-and-so's going to visit you here in a few days, you've got to take people you think you can best spare and at the same time can do a reasonable job of touring these people. For the technical visitors, you've got to turn more to a technical operator. It is disruptive, and

these visitors appreciate that, but we accommodate them, nevertheless. Of course, the manager sometimes has to be involved in that, too. You've always got to say hello to these people and give them a little bit of time, but it's a give and take situation. We went out to visit, too, and visited a lot of properties. So it's something that we live with.

I was nine years at Cortez, and when we ran out of ore, I elected to terminate. I had to terminate all but a half a dozen of the people and terminated myself. The company didn't terminate me; I terminated myself. At that time, Placer, the operator there, didn't have anything very suitable for me to go to, and rather than sit somewhere and twiddle my thumbs at a desk, I elected to go seek other work. At that time, the uranium industry was still booming, and new gold mines were opening up. So there was no lack of work. Well, at that time, I think there was more activity in uranium than there was, actually, in gold. I can recall getting a half a dozen different offers. One was in a silver operation, silver mine, where the processing was very similar to gold processing. Another was a coal operation, both underground and strip mining. There were several uranium operations that were just starting up and had need for managers. I elected to go with Homestake Mining Company, who were attempting to develop a uranium project in Colorado which they called the "Pitch" project. It's near Gunnison, Colorado. It was wholly owned by Homestake Mining Company. I was involved with Homestake for only a year, but they could not ever get a permit to build a mill. That was pretty evident to me after being there about a year.

The Pitch project never actually opened, but they did do some work out of that mine?

They had a property where, at some point prior to the time they acquired the project, they had had a mining permit. So

they were grandfathered in with this mining permit. That allowed them to mine, but, of course, they weren't really interested in doing just the mining. They had to have a processing plant, but they owned a uranium mill in Grants, New Mexico, so they elected to do the mining of the higher-grade ore and truck the ore all the way to Grants, New Mexico, where it was processed for several years, but the plant that we had envisaged and engineered was never permitted.

So after a year, when you could see that, what happened for you?

Well, I just elected to bow out. In other words, I didn't have a project. I left Homestake at that time and went out on my own. For a short period, perhaps a year, I had a couple of partners and formed a little venture that involved looking throughout mainly Nevada at old mine dumps with the idea of sampling these dumps, and if we could find sufficient low-grade ore in these dumps, we were prepared to put up a small recovery plant and process these dumps. We had a financial backer. We looked throughout the whole state of Nevada. For instance, we would research the literature, and we'd go into the mining district, sample the dump, employ a backhoe, maybe. If need be, we'd backhoe it. If not, we'd just sample it by hand. We'd actually, in some cases, charter a small airplane and scour some of these areas and look at these dumps from the air and then go visit them on the ground. The bottom line was that we never did find anything that was suitable.

This was 1978. We just terminated that project. We all went our own ways, and I went into consulting work. I believe I did some consulting work during that same period, too, 1978. As I recall, one of the first assignments I had was consulting for American Selco on a little project in the Ely area. Actually, quite a ways out of Ely, but it's over in that part of Nevada. They had developed

three small gold deposits that were amenable to open pit mining. The grade was such that it appeared that heap leaching was the direction to go in, rather than milling. The ore was a very good leaching ore. So I got them started with some pilot-scale leaching tests in the field, complete with small recovery plants. American Selco is a subsidiary of Selection Trust of London, England. Their background in mining, I think, had been limited to some operations in South Africa. They weren't really current, and they weren't familiar with this area. They weren't familiar with heap leaching. By and large, they just weren't well-grounded in mining, particularly in this neck of the woods. John Prochnau was the local manager. His activities were essentially exploration—John was a geologist—and he retained me to get them going in the right direction, which appeared to be heap leaching, and it appeared it had to be done at relatively low capital cost. The grade wasn't bad for heap leaching, but it wasn't anything to shout about. In this particular project, they joint-ventured with Occidental Petroleum, or Occidental's minerals department. That complicated endeavors somewhat, because Occidental, although they were a minority and had a minority interest, wanted to get very involved in the project. And then the people gradually started flocking in from London. I think part of the reason was that when they left the country, they didn't have to pay income taxes, so it was really inducement for them to get out of London, get out of the country. They ended up engaging Bechtel Corporation, and they put in a plant that cost them \$34 million, whereas I had planned on an operation that would cost in the area of \$10 million to \$12 million. The bottom line is that I'm sure there was never a dollar made on that project, and it should have been a good money-maker.

Of course, with Bechtel, this was typical. Any plant that Bechtel ever built, you can expect it to cost two, three times more

than what it should cost. Going back in my earlier days, Bechtel was pretty prominent in building plants domestically, but their costs kept escalating. Their charges for construction, construction management, just got exorbitant. They essentially lost all their domestic business, so in recent years they went on to some foreign mining projects—not a lot of them. They've done the odd one, and their big field is in pipeline work, oil refinery projects, and most of it is overseas, a lot of it in the Arab countries. So they've just essentially put themselves out of the mining business here in the United States.

Was that a disappointment to you to see this operation not make a profit?

Well, it was a disappointment. It was a good project, a good ore body. Probably a much bigger disappointment to John Prochnau. He was the manager. So, as a result of that, John stayed on for some while, but he ended up leaving that organization, but anyway, they went on and mined the deposit out. My bet is that if they didn't lose money there, they certainly didn't make any.

As a consultant, were you still involved when Bechtel Corporation came onto the scene?

No. My work had hardly begun. My work didn't get beyond the testing stage. We could see that it was a viable heap leach situation, but we had to do the test work in order to properly design the recovery facility. We had to get to know what the recoveries were and the length of time to leach and the size to crush to and all those factors had to be determined from the leaching tests.

I guess about that time, I was getting involved with the Pinson project, with the different Pinson people and their joint-venture partners. Some of that I did concurrently with other consulting work that I had been doing. Pinson project is about

forty miles out of Winnemucca, twenty miles north of Interstate 80 at the Golconda interchange. It was a gold mine. The deposit had been drill-defined some few years prior to the time I got interested in it. It really had to wait for a higher gold price, and when that gold price got up we were in construction. That was in 1980. The gold price in 1980 was \$500 an ounce and over. When they first drilled the deposit, I would guess that the gold price was probably under \$200 or around the \$200 mark, but as it escalated, why, it became very apparent that now this was going to be a pretty lucrative mine, and it certainly was. The partners involved were Rayrock Resources, the operator; United Siscoe, a predecessor of what is now Barrick Gold; and Lacama Mining, a company that Homestake Mining ultimately took over. Today, the ownership there rests with Barrick Gold and Homestake. At the time the joint venture was put together, there were also three individuals as partners: Pete Galli, John Livermore, and Don Duncan.

So you three were partners on the Pinson project?

On the Pinson project only. Planning and engineering commenced during 1979. In 1980 it was under construction, and we had a plant start-up in December of 1980. The first gold was produced in January of 1981. The plant started off designed for a thousand tons per day, and through increases, it gradually got up to 1,500 tons per day. So as gold plants go, it was a medium-sized operation, had about 130 employees.

The ultimate production of the Pinson was a little in excess of a million ounces. The plant was somewhat unique, and it was one of the first of the new carbon in pulp plants. The concept was borrowed from an operation in South Africa that was called Modderfontein or Golden Dumps. The Golden Dumps was processing old mill tailings with the carbon in pulp process. Now,



Early stages of the pit at Pinson.

carbon in pulp, in addition to Golden Dumps, had been utilized at Homestake's operation in Lead, South Dakota, which was a change from their earlier operation. It was a modification that was made in the plant, oh, a few years prior to the time we're talking about here. So carbon in pulp wasn't new. I think carbon in pulp, as a matter of fact, had been utilized at an operation I mentioned previously at the Cripple Creek, Colorado, Carlton Mill. The concept wasn't new, but there were a lot of innovations and design changes incorporated in the Golden Dumps and the Pinson Mill.

Probably, the most glaring one I can think of is the nature of transferring carbon from one tank to another. The carbon in pulp employs typically anywhere from three to four to as many as five tanks, and the pulp has to be transferred from number one tank, say, to number two to three to four, succes-

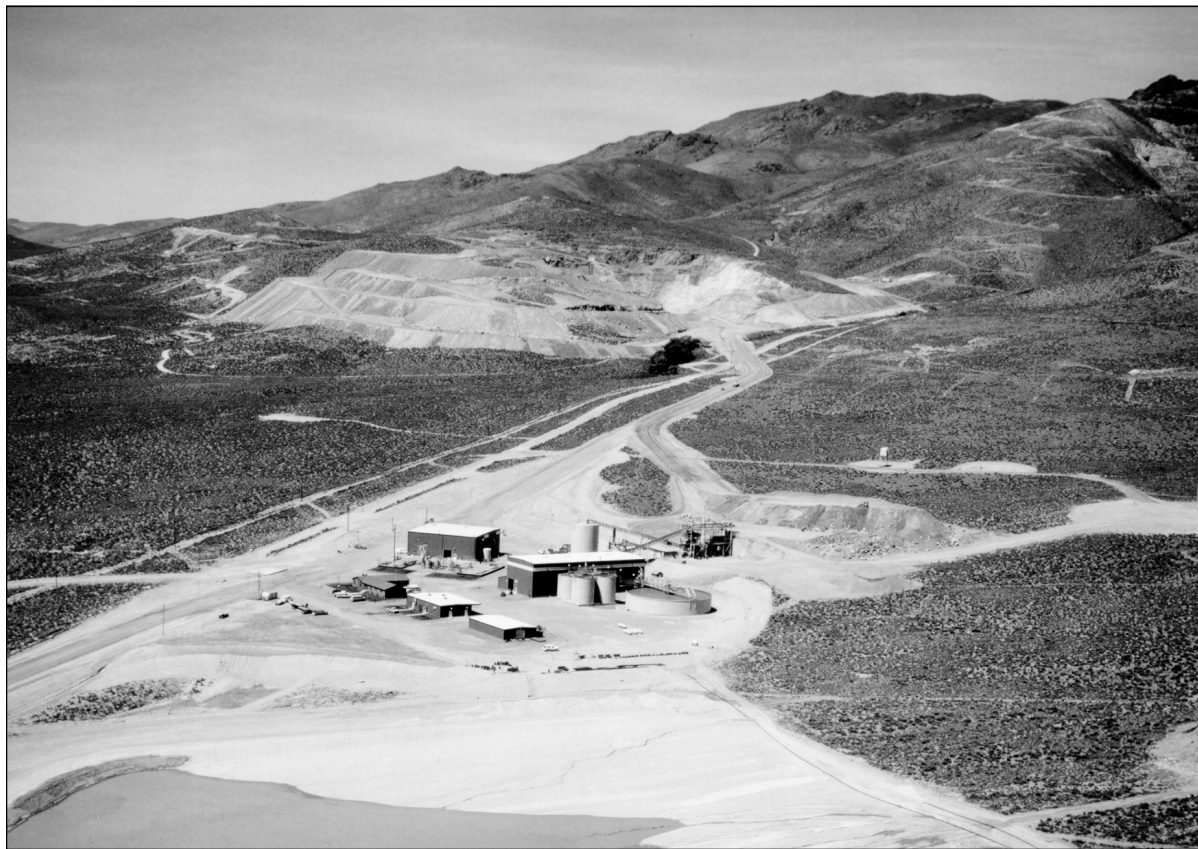
sively through these tanks until it reaches the last tank where the last of the recovery takes place. The carbon must be advanced in the tanks, countercurrent to the pulp flow, and the procedure for retaining the carbon was an innovation, and that procedure was to use launders that ran from one tank to the next, and these launders contained screening. The screens wouldn't allow the carbon particles to advance, being larger than the ground ore particles. So the carbon particles would stay in the tank. The pulp would enter this launder and be transported down to the next tank. These tanks were stepped in elevation, and the launder ran down a small, gradual slope. The problem with the screening arrangement is that the carbon would plug the screens, and an arrangement had to be made to keep the carbon off the screens, and that was done using air. We had air jets creating turbulence

adjacent to the outside of these screens, and the turbulence would keep the screen open, so that was an innovation. To move the carbon upstream, a special pump or air eductor would periodically lift a given amount of the carbon-containing pulp from a tank to the next higher one. At the last or highest tank, the loaded carbon would be removed by using a conventional type of inclined vibrating screen.

Subsequent to the Pinson design work, there was another operation in the area, now Battle Mountain Gold. In those days, it was the Duval Corporation, who operated a copper mine and then turned this copper plant into a gold plant. They attempted to recover the gold on carbon that was contained in cylindrical cages that were fabricated with a screen material. They would dump this container, this cylinder, made up of screening material loaded with carbon into a tank

and let it load up, and then they would remove the cylinder, open it up, and recover the carbon. There was one of these in each of their leaching tanks. Well, that was a dismal failure. The carbon didn't load sufficiently high. Pulp would get mixed up with the carbon, and they'd end up with a mixture inside these cylinders that was a mass of both pulp and carbon. That didn't work, so they attempted to innovate and come up with another arrangement, and again it didn't work. So today, carbon in pulp plants or carbon in leach plants use the Pinson arrangement or some modification of it.

Carbon in leach is a variation of carbon-in-pulp. In the early days, we felt that we would lose excessive carbon in the leach tanks, due to abrasion, since leach tanks are agitated rather violently. They're agitated to keep the pulp in suspension, and they're also



Panorama of the Pinson Mine with the pits in the background and the plant in the center.

agitated to improve on dissolution of the gold. This agitation is going to abrade the carbon, and you'll get attrition losses. Activated carbon particles have sharp edges, and these sharp edges will break off, become fines; they load up with gold, and once in the fine form, they're lost. They go out with the pulp. You can't recover the carbon. You can't keep it in the circuit.

You lose gold through the fines. Well, we were very concerned. There had been little experience prior to our getting involved here with carbon in pulp. So instead of placing carbon in the leaching tanks, we would do our leaching first, and then we had a separate circuit where we'd put the carbon, that didn't require all this agitation, and we felt that we would have a lot less attrition loss, and so the Pinson plant was built with what we called then "carbon in pulp." Today, typically, the circuits are called carbon in leach because the carbon now is entered right into the leach tanks, so it saves a second circuit of tanks. Actually, Pinson converted some time after I left to carbon in leach.

Now, were you involved in operations at the Pinson?

Well, I had a contract to manage the engineering, construction, staffing, and start-up. This involved about two years of my time, essentially full time. Once I had the project well-staffed and located a manager, why, I left. I continued my involvement as a partner.

Did you like that way of working with a project, doing the start-up?

Well, I enjoyed the arrangement. I had the background, the knowledge of gold plants, the operating experience, both in gold processing and open pit mining. They recognized my background and saw that I could handle the situation, and after meeting with the various partners, why, they agreed that

Don Duncan would, in fact, go ahead under contract and do this project.

It seems like a very good use of your skills from all the experiences that you've had along the way—to be able to come in and get a project going.

Well, it was also a relatively cheap way of managing a project. If they had done it through an engineering firm, it'd certainly have cost them more money.

I stayed longer than I had intended or wanted to. It was a matter of finding a manager, and the manager—it took him a year to get on site, and that's the reason why I was there for almost a year longer than I anticipated. He had been working in uranium mining in New Mexico, and he had certain obligations that he had to fulfill. It just took forever, it seems, to finally get him to move in there and take over.

Once you got your manager on board at Pinson, where did you go from there?

While I was at Pinson, I got telephone calls perhaps as frequently as three times a week to work with the Pegasus people on their heap leaching operations at Zortman and Landusky, Montana. My response was always the same: that I couldn't really help them any, because I was totally involved in the Pinson project, and until such time as I left there, they'd have to do without me. But as soon as I was free, I would be more than happy to do some consulting work for them and try and openly resolve some other processing problems that they had.

When I left Pinson, then I was engaged with Pegasus on an almost permanent basis. A little later on down the road, I was involved with them, essentially, permanently. Actually, I was an officer of the company for a period. Their operations at Zortman and Landusky, Montana, their main problems had to do with the recovery plants.

They had two projects there, as the name implies. The recovery plants were Rube Goldberg type. They were constructed in truck trailers fabricated off site and trucked on to the sites. The equipment just wasn't up to snuff. They were utilizing zinc precipitation. The clarification apparatus they were using was totally inadequate and was a good part of their problem. What had to be done was build two new plants. So I engaged and hired a metallurgist who was familiar with zinc precipitation. And he was actually responsible for putting up two new plants for them. We bought essentially used equipment, but good used equipment, and when those two plants went on stream, why, their problems were resolved.

From then on, Zortman and Landusky operated for many years. As a matter of fact, they've operated up until just fairly recently, and this goes back to 1980, actually 1981 when I got involved. I was involved a little bit during 1981, but towards the end of 1981, I was involved almost full time. When things settled down at Zortman and Landusky, I got involved with another one of their projects which subsequently was called Beal Mountain. In those days, the project was called Montoro, and it was a separate company called Montoro Mining Company. But when they ultimately developed a mine, it was called Beal Mountain. That project was located somewhere west of Butte, Montana. I put together a team of engineering people, permitting people, and we engineered various facilities and attempted to get permits, which didn't happen.

I'm noticing that this is different than when you started at the Cortez, and you didn't have to do permitting.

That's correct.

So you're now talking about a big change in how you start up an operation. Tell me

what was happening in those years between the Cortez and Beal Mountain in terms of legislation and so on.

Well, in those days in Montana—this was subsequent to Zortman and Landusky—permitting hinged on politics. The governor at that time, of course, brings in his staff people, and if he's anti-mining, which this fellow was, you don't get permitted. They'll go through the motions, but they'll never issue a permit. So this was the second operation I was involved with that had that problem. The one in Colorado—they had a governor that was anti-mining, and he just wouldn't see a new mine. And again in Montana, and subsequent to that, they acquired a governor who was pro-mining, and they ended up getting permits and built a facility. We engineered for—must have been a good couple years—different sites, different processes, all the way from heap leaching to milling, with a mine on site and a mill six miles away, this sort of thing. Nothing would work. Finally, I got frustrated to the extent that I went to the president of Pegasus, and I said, "I can't do you any good here. I've been a complete failure in getting this thing permitted." I said, "Why don't you go and talk to the governor and see if that will do any good. At least you'll see first hand." He did that, and he got nowhere.

So at least he could see where the stop was, where the stoppage was. Did you ever run into that in Nevada?

No, we never ran into anything like that in Nevada. The administrations in Nevada here have been generally pro-mining. Mining has been too big a factor here in Nevada and too important money-wise for them to take any anti-mine stance.

Whereas in Colorado and Montana, there are some other economic factors involved.

So that ended my involvement with Beal Mountain. The next project worthy of mention here, I'd say, under the category of Pegasus, was their Florida Canyon project. Florida Canyon is located just off of Interstate 80 about forty miles or so west of Winnemucca. As you're driving Interstate 80, you'll see the facility. It's almost on top of the highway. It's still operating.

There had been some limited drilling done, and the Asarco organization had the property position prior to Pegasus getting involved. Following their work drilling, they packed their bags and left. They retained a section of land that they acquired for little or nothing, and the maintenance, the holding cost, was very little on that one section. The rest of the property they turned back to the property owners.

So when we appeared on the scene and acquired the property that Asarco had dropped, we did our exploration drilling. We could see that in order to make a mine, we had to have this one section of land that Asarco still retained. It wasn't until after I became disinvolved that Asarco agreed to relinquish their section. Asarco had attempted a joint venture with us, and we wouldn't agree to a joint venture with them. Asarco was a very conservative company, not very aggressive. They had the property; they didn't seem to have the where-with-all to do anything with it, to develop it. They had other properties, like Rochester, which became a very substantial silver mine. They sat on Rochester for years and years, did nothing with it. Finally, Coeur D'Alene Company took it over and developed it. So Asarco we could see would make a very poor partner. It would have been a *major* clash here of philosophy and what to do with the property, and so there was no way that we wanted to get in bed with Asarco.

So my first endeavor was to open up an office in Reno and Winnemucca. I hired a V.P. of operations. I hired a V.P. of explora-

tion. The V.P. of exploration was based here in Reno. We put a large property position together. With the acquisition of the Asarco section, we felt pretty confident that we had a viable mine. Actually, some of the original test work I got involved with. But by that time, why, Pegasus was staffed up with some pretty competent operating people, and I elected to leave when they had a change in senior management. The president left; they came in with a new president, who I didn't feel very comfortable with, and so I elected to go on to other things, and Pegasus went along without me. But at that point in time, we had built up a good company that was quite profitable despite the fact that their mines were very low grade. More recently, we've seen the company go down hill, go into Chapter Eleven, and this has been the result of bad management.

Not just the low prices, then?

Not just the low prices, no.



We talked about the heap leach process and how it advanced and changed over time, and you wanted to add some information about types of sprinkling systems that were used. Would you give us that?

Yes. We mentioned the Rainbird sprinklers. That's the original sprinkler that we used. Then we went from Rainbirds to wobblers and wigglers—wigglers being plastic surgical tubing, short lengths, like ten inches or so.

And tell me, what was the advantage of that surgical tubing?

The surgical tubing put out large droplets of solution, so we minimized evaporation that way, whereas the Rainbird and even the

wobbler put out finer spray, and we incurred a lot more evaporation and loss of solution, loss of water. When you lose solution, you're losing cyanide. Cyanide breaks down. So the wiggler had that advantage. Of course, we went on and talked about the drip system, which is even an improvement over the wiggler.

Are the Rainbirds, the wobblers, and wigglers still being used today?

They're used to some extent. They're used, for instance, on the sides of the heaps where, perhaps, a drip system just is not applicable.

So primarily, the technology has advanced to the drip system?

To the drip system. And, of course, that's borrowed from the agricultural industry. The farmers have used the drip system for a long time.

You were also going to give me some information about the carbon in pulp process, specifically something that Duval had used that was not successful.

Yes. The procedure was to put carbon in baskets, so they call these carbon baskets. As such, it's not *typical* carbon in pulp. It is carbon in pulp, but the carbon is contained in these baskets. And the idea was that you could remove the carbon from one stage, one tank, into the next tank, simply by moving the basket. The problem with the system was the absorption rate just wasn't adequate with the carbon confined in a basket. That system was, near as I know, dropped.

So that was an experiment that didn't work. Another thing that you mentioned was that the liners for the pads have changed, and there are several kinds.

Well, various types of plastics have been used, and we talked, I believe, about HDPE, or high-density polyethylene. There's been low-density polyethylene used, which is a bit cheaper, I understand. There's been PVC, or polyvinyl chloride. Hypalon is another one. It's one of Dupont's trade names. And there are other types of plastics that have been used, but predominantly, I believe the HDPE is the cheaper and the one that's prevalent today.

Tell me a little bit, too, about the progress in terms of the leach pads. You mentioned a dedicated and an on-off leach pad. Would you explain those to me?

Sure. The on-off pad is a more expensive pad. It's typically an asphalt pad, which you use several times over, and, of course, you have to remove the leached-out ore. Typically, the equipment must run over that pad frequently. It's got to be a more substantial pad than would otherwise be the case. The problem with the on-off pad system is that more often than not, the leached ore has to be removed before it is completely leached in order to make room for new ore. Well, there's typically quite a loss of gold associated with the on-off leach pad system.

Dedicated pad is where the leached ore remains on the pad, and you just go to a new area and keep building new pads. The ore is never removed from these pads. This allows you to come back in time and releach these heaps and get the ultimate, maximum amount of gold extraction. That you wouldn't get with the on-off pad system.

And there's some advantage of leaving it and coming back over a period of time?

Yes. We typically find that if a heap will be allowed to rest for a period, you can come back and put new solution on it and get quite a dramatic increase in gold content. It's part

of that system, where the pads should be allowed to rest, rather than to attempt to completely leach it in one time frame.

How does a company make a decision about which of these to go with? Do you know some examples of where those decisions have been used?

Well, Smoky Valley Mining Company has used, for many, many years, the on-off pad system, and today I think they've recognized, or have recognized in the last few years, that that's been a major mistake. And they have now converted pretty much to a dedicated pad system. They have all the space in the world. Smoky Valley does.

So from what you described, the only time you would go with this more expensive on-off leach pad would be what kind of situation?

A situation where you're in a very confined area, usually in a mountainous area, with no room to build these pads, which do take up a lot of space. And a successful leach pad has to be on a relatively flat slope. The preferred slope is somewhere in the vicinity of 6 percent, say, or a range of 3 percent to a maximum of 10 percent slope. So if you don't have that, then you might be forced into an on-off pad system, where you'd excavate an area that was the appropriate slope, build your pad there, and then go to the on-off system, because it would be too expensive to try and excavate in the side of the mountain to make enough space for the dedicated pad system.

Are there any environmental issues involved in the decisions about which are used, or is it entirely a space and cost factor?

No. I don't think the environmental considerations would be a major factor in

determining what system you went to. It's more cost than anything else.

We talked about the Golden Dumps Mine in South Africa, and you had a couple of comments to add to that information.

The more formal name for the Golden Dumps operation was Modderfontein (Afrikaner or Dutch name). I visited the Golden Dumps operation because I considered it to be the first of the modern day carbon in pulp circuits, designed from day one to be a typical modern-day type carbon in pulp plant.

And what's the difference when you say modern day versus some of the originals?

Carbon in pulp had been used in a couple of plants that I'd seen, visited. This goes back quite a few years. It was used at Homestake's Lead Mill to replace a particular part of their gold recovery circuit, but it replaced just a smaller part of the plant. And then it was used also at the Carlton Mill at Cripple Creek. That plant was a custom plant, custom-treated ores of various types, and because of that, they needed different recovery processes. They did use carbon in pulp to some extent in the Carlton Mill. But you wouldn't call either of these plants a carbon in pulp plant, per se.

Because what they were using it for was more of a supplementary purpose. It wasn't the main process. So this one that you visited in South Africa was the first that was set up entirely to be a carbon in pulp operation?

Carbon in pulp plant. And the only changes that have been made have been mechanical rather than metallurgical.

Now we want to go to your next adventure, which was with Hycroft.

The mine was the Crofoot Lewis Mine. It's located about sixty miles due west of Winnemucca. The company's name is Hycroft Resources and Development.

Were you employed by them, or were you a consultant?

I was a consultant for the project. I was contracted to manage the engineering design, construction, staffing, and start-up of the operation.

Describe to me how you got started with this project.

Well, to determine the metallurgical characteristics of the ore, initially, we would do small-scale, lab-type, leaching tests, column tests. But I always felt in order to get a better handle on the metallurgy, we had to go to larger scale tests, pilot scale tests in the field. Some of these ores give us percolation problems. And it's not that easy to determine percolation rates from lab scale column tests. The percolation in a column can give you erroneous results. You can get channeling down the walls of the column, whereas in a heap, you can get poor percolation, and you're going to see it, and you can design for it. At least you know that you have a slow percolating ore, and that's very critical in a heap leach operation. The big advance that was made—this goes back to the early days of heap leaching—was to introduce Portland cement into the ore, and that sets up the ore sufficiently to allow better percolation.

You have some pictures from that operation. The picture that we're looking at right now is of the pilot scale test? It looks like a complete mining operation to me.

In this case, we had two ore types. Each pile was approximately, as I recall, three to four thousand tons. And each heap, or pile,

then had its own solution ponds, and we had a portable recovery plant. It was a multi-stage carbon column. It was like a little portable recovery plant. We actually made gold, refined it. This, then, gave us the design criteria for the commercial operation. That was abandoned and restored, and the bigger operation was adjacent to this, however. This little plant sat right on the edge of the Black Rock Desert.

Is it right where the road comes into the area now?

Yes. We can see the road here. It's only one hundred yards away.

So after the pilot testing, what happened next?

Well, the parent company of Hycroft, or principal owner, was a company called Grangus, Grangus Exploration. And it was predominantly an exploration company, although they had one other operating mine about the time that this went into production. Grangus raised the funds; bond and debentures sales were the means of financing the project to the tune of about \$34 million, \$30 million of which went into the physical plant and equipment, and about four million went into exploration of the deposit. At that time, it was probably the lowest grade gold deposit anywhere that required crushing. Anywhere in the world.

Yet it was feasible to mine this because of the process that you were using?

Well, it was feasible. It was never much of a money-maker. As a matter of fact, some of the debenture bonds were bought up by the company at twenty cents on the dollar. So some of the original investors lost money on this. Most of that money was raised in Europe.



"This little plant sat right on the edge of the Black Rock Desert."

Now with this system, there is the secondary and tertiary crushing plant, which consists of three seven-and-a-half-foot Simons cones, an array of screens and conveyors. Prior to the secondary, tertiary crushing plant, we have the primary crushing plant. And that was a large gyratory crusher, which was taken from an abandoned copper mine in Arizona and moved on site.

And then it's conveyed from the primary crusher to an open stockpile. The primary crusher made a product of about six, seven-inch material. That was reclaimed from the open stockpile onto a conveyor with several

draw points and conveyed to the secondary, tertiary crushing plant.

When you say draw points, what are those?

Those are underground chutes that draw from the open pile down onto this conveyor belt that runs in, essentially, a tunnel. It's a large corrugated iron pipe, which is buried underneath this open stockpile. There are several of these drop points in order to maximize the live load from the open stockpile. From the open stockpile, the ore is fed continuously around the clock to the secondary crusher, which, as I mentioned, is a seven-



"Prior to the secondary, tertiary crushing plant, we have the primary crushing plant. And that was a large gyratory crusher, which was taken from an abandoned copper mine in Arizona and moved on site." The primary crusher, looking down onto the hopper.

and-a-half-foot cone. It ends up in the two tertiary crushers, where the final product is three-eighths-inch material.

Now this is all open. Is this under construction? Was this enclosed once it was finished?

No. That's all in the open. It stayed in the open as you see it. The primary crusher operated, typically, one shift a day, whereas, the others ran continuously twenty-four hours a day. And the open stock pile allowed more continuous operation of the rest of the crushing.

The panoramic view shows the plant site. It shows the warehouse building, the truck shop building, and the office. Here's the office. You're looking out across the Black Rock Desert. This is the access road

we're looking at here. There's also a railroad running by here.

The plant had various conveyors. The one conveyor takes ore from underneath all three crushers, takes it up over a tower with a screen. You have two ore products: the undersize of the screen and the oversize. The oversize goes back to the crushing facility again. The undersize is the final product and ends up out on the heap area.

How did it go to the heap? Did they haul it in trucks?

No. It was by overland conveyors. There was no trucking, which allowed for very cheap heap construction.

Because with this being the lowest grade ore deposit in the world it needed that.

You had to have a very low-cost transportation.

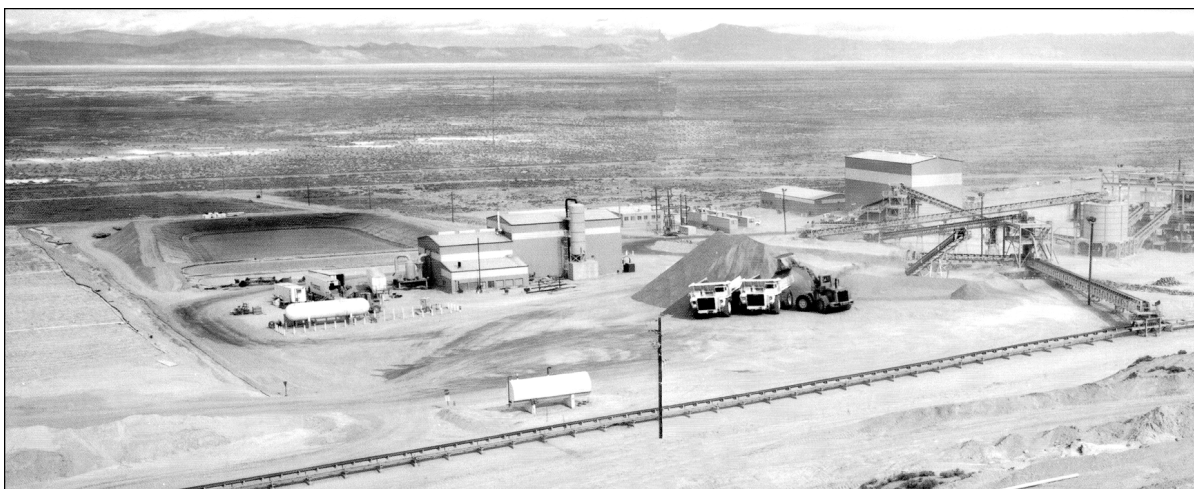
You mentioned the conveying system, and I was curious to know whether that was unusual to have a conveying system rather than trucking.

Well, the advantage in a conveying system is the cost. We transported ore at a cost of somewhere in the vicinity of ten cents a ton, which probably beats out truck transportation. If we were to transport it by truck, we would be talking about, perhaps, something closer to twenty, twenty-five cents a ton. So it was a monumental benefit in conveyor transportation of the ore to the heaps. The system included what we called an overland conveyor. I believe the initial length of that was in the order of three thousand feet. And it was extendable in, say, three-thousand-foot increments. This conveyor had a tripper, which ran on rails, which could move the length of the overland conveyor and place the ore on a transverse shiftable conveyor. A shiftable conveyor is mounted on rails, and it was shiftable with dozers in increments of about three feet. There was a special attachment on the dozer that would actually lift the conveyor just barely off the ground, and in a single pass, the dozer would

shift this conveyor approximately three feet at a time. So the dozer would walk back and forth until the conveyor was shifted to an extent that accommodated the stacking conveyor. The stacking conveyor typically had a range of stacking about a one-hundred-foot swath. Well, when this one-hundred-foot swath was added onto the heap, then the shiftable conveyor would be moved using the dozer and its attachment. So it was all fully automated. The shifts would be done probably in intervals of a week, ten days.

So a week to ten days per hundred-foot swath. It took that long to fill up that portion and then go onto the next on the pad. Is that correct?

That's correct. A couple of further comments, maybe—this shiftable conveyor was flexible in a vertical configuration. It would start off from the overland conveyor and ride up a slope, which was probably in the order of a 20 percent slope. And then it would level off. The time it took to shift this conveyor with the dozer was approximately an eight-hour shift to move it the hundred feet in three-foot increments. In other words, the dozer was picking the conveyor up with a special attachment, and it was actually dragging it over three feet and walking the full



Panoramic view of the plant.



Aerial view of the plant site.

length of this fifteen-hundred-foot conveyor. So each time he walked the width of that heap, he'd have moved the conveyor, drug it over three feet. By the time he'd finished moving this hundred feet along the length of the heap, the conveyor wouldn't be lined up 100 percent, but then the dozer would turn around, and by gently pushing on these rails, he'd line it up so that the conveyor belt would track properly. This transverse shiftable conveyor was a conveying system that was used in Germany in the coal mines. They were experts with the shiftable conveyors and used them extensively. They have very little application in the United States. There are only two other instances that I'm aware of where these shiftable con-

veyors have been used in the United States. One was in a coal large coal operation in Washington, and the other was a granite quarry near Watsonville, California. None in gold. This was the first application for shiftable conveyors in gold mining.

It must have been interesting to work on that, knowing it was something different.

Well, a lot of custom design was involved here, too, in the trippers. The transverse shiftable conveyor had its tripper mechanism, which fed to a radial stacking conveyor.

So it wasn't something where you knew immediately as you were designing it how it should be, but you had to kind of work the bugs out over a period of time?

There were some bugs in the system. The overland conveyor really was a pretty standard item and didn't give any problems. The shiftable, we had to learn how to shift it, and initially, we allowed twenty-four hours to shift that, and it did take twenty-four hours. But finally, they got it down to even less than an eight-hour shift. But the concept changed a little bit. Initially, we had contracted for a track-mounted stacking conveyor that would build the heap with feed coming off of the shiftable conveyor. And that was discarded along the way. It didn't get up to proper speed, and we had to abandon that track-mounted stacking conveyor. Concept looked good. The machine was designed to build a heap from the bottom up as opposed to from the top down, which would have the advantage of improved percolation of the heap. But it was somewhat of a mechanical failure and had to be abandoned. We had incorporated a back-up system in the event that that didn't work, and we had to go to the back-up system, which was a conventional radial conveyor, stacking conveyor, which is more or less a shelf item.

You mentioned building the heap from the bottom up or the top down. Would you describe that to me?

Well, that probably requires a little explaining. Building a heap from the bottom up, in the case of this track-mounted stacking conveyor, the boom that discharged the ore would start down near ground level, and it would make a pass across this hundred-foot width that we're talking about, and then the next pass it made, we would elevate that conveyor. And let's say we were building a pass of approximately three feet high. Well, the conveyor then was capable of being moved up in elevation for the next pass, and we'd make another pass until we'd reach the ultimate height of the heap, which I believe was designed for fifteen feet.

And then how do you do top down?

Well, from top down, the radial type stacking conveyor typically will be inclined above the height of the heap you're building, and the ore will drop all the way down to the bottom of the heap, and it will build up, and the conveyor being radial, why, it rotates through this hundred-foot width.

The bottom up actually had some advantages in terms of the percolation?

What happens when you build a pile, a heap, with the radial stacker is, you get classification of the ore. The coarse material will roll down the slope of the pile, and the fines would hang up in the top center of the pile. So you're getting classification of the ore. So you get these fines built up in one area, and those fines are not going to percolate like the coarse material is. So you're building a heap with classified materials. Some parts of it are made up of fines. Other parts of the heap, it's coarse ore and solution, is going to be channeling down through the

coarse material and not leaching out the fine material. That's the advantage of building the heap from the bottom up, if you can devise a method of doing it efficiently.

This stacker equipment that was mounted on crawlers was designed so that the boom could be . . . there's a term they use, "luffing." And I believe the luffing relates to the ability of that conveyor to raise and lower. It could also swing, because as you were building your heap, you had to accommodate the heap slopes. Well, both sides of that hundred-foot swath had these, more or less, forty-five degree slopes. So in order to properly build the heap, you had to have the ability to luff and to swing that conveyor. And this machine was designed to do all of that. The failure was related more to the structure of the system. It failed structurally. The crawling system, too, was undersized, and it went to a larger crawling system. By the time they beefed it up with larger crawlers and with a heavy structure, it was overweight, and it got to be unstable and proved to be a safety hazard. So it was abandoned in favor of this radial stacker.

Now, the system that you helped work on and put into place, is that what operated for all these years at Hycroft?

This was in 1987, 1988. That mine just recently closed a few months ago. It operated with that conveying system ever since then. And very efficient, very effective, low cost, I would say, and reasonably low capital cost involved. We had to keep the capital cost down because we had a very low-grade deposit.

Yes. It's really one of the casualties of the drop in gold prices right now because it's such a low-grade operation.

Oh, definitely, it is.

Anything more that we should add about Hycroft and the Crofoot Lewis Mine?

I think we've covered it reasonably well. I might mention that the plant was designed to process a thousand tons per hour. All the conveying, crushing operations were designed for a thousand tons an hour. It operated at somewhat less than that. I think they settled at something like seventeen thousand tons a day.

So that was one of the projects that you consulted on. Were there others that you'd like to mention that you helped get started and might have had some differences, here in Nevada?

I'd like to comment here on what's now called the Independence Mine, which was put in production by Freeport Minerals along with their venture partner, FMC Corporation. The Independence Mine was originally named the Bell Mine in recognition of a geologist, Enfield Bell. Unfortunately, they dropped the name Bell Mine and have gone to Independence Mine. But during the exploration of the deposit, both Freeport Minerals and FMC had considerable reluctance in going ahead with the development of the mine. They felt that it wasn't financially attractive enough. And Enfield Bell, who was a pretty good friend of mine, had considerable difficulty in convincing them that they had a very viable situation. Freeport engaged me to come up with a short report which would suggest that it was a very viable project and that the capital costs would be within a certain range for a specific sized plant, and which I think maybe gave them some impetus to go ahead and continue their exploration and go into development.

Because that Independence Mine has been in operation for some time, hasn't it?

That was in construction at the same time the Pinson Mine was under construction, which was in 1980. So, yes, they've been in production now for eighteen years. FMC, like Freeport, was even more reluctant to invest in the project and engaged me to be involved in working on the feasibility of the project, so I got to be intimately involved there in the economics of the project and spent essentially a whole winter working with them on the economics and feasibility.

They had the option of either taking a 30 percent equity position, or an 8 percent royalty position, and they had to make a decision as to how to approach their arrangement with Freeport. The economics looked good, and they decided to contribute 30 percent to the project and stay in and maintain an equity position.

And that was the main part of your, looking at the feasibility of it?

Yes. It was strictly a more minor consulting arrangement, to work on the feasibility, part of a team situation. I was a team member in the study.

Independence Mine is outside of Elko, correct?

Yes. They get the name from the Independence Mountain Range, which is north of Elko. The mine itself is in the order of fifty miles north of Elko, I believe.

What do you have next on your list?

Well, I can comment a little here on a project over in Australia. The company was called Pan-Australian Mining, and this was their Mount Leyshon Mine, which started off as a heap leach operation. As they got into deeper ore and sulfide ore they went into a milling operation. I was involved in the initial stages, so we were at that time only

working with the heap leaching concept. I made two trips to Australia to be involved in the design element. They had contracted engineering to a local Australian engineering firm, and, of course, an Australian construction company. My involvement was working with the design concepts of the plant, the engineering of the heaps, and some involvement in the crushing facility.

How did this compare in terms of technology to what you were seeing in the U.S.?

The only substantial difference, I think, had to do, perhaps, with water. They were not blessed with an adequate water supply, and they had to create big reservoirs and capture as much run-off as was possible in order to come up with enough water to make a mining operation. Other than that, the project was pretty similar to a lot of these others.

The only comment I can think of is that the wildlife, the animals, over there are different. When you're driving around these Australian roads, you really have to watch for kangaroos.

You mentioned that they were everywhere when you were showing me a picture of that area.

Oh, you just wouldn't believe the number of kangaroos. They just proliferate. They're all over the place.

Was it an unusual and neat thing to do—consulting overseas at that point—for your company, for you personally?

Well, I would say it was interesting. We were working in a different environment, and the people are a little different over there. It's a little hard to understand the Australian language. Certainly, this was a difficulty. This mine was owned by two people, and they were both geologists. And one fellow,

his Australian language was a little bit tough for me to cope with. The other fellow was no problem. It's just a little different world.

They had different words for some things, and their accent can be very difficult to pick up at first, right?

Well, the pronunciation, too, is pretty poor. They don't enunciate as well as we do here. Certain people, I had problems understanding. And my hearing isn't 100 percent anyway, and so that added to the problem. But this was a very lucrative deposit. They made lots of money in heap leaching, and then ultimately built a milling plant for the deeper ore. This was in eastern Australia, in Queensland and approximately seventy, eighty miles from the coast inland from Townsville.

Back to Nevada, what other projects did you work on in Nevada?

I'll mention the American Selco Alligator Ridge Mine out of Ely. This was a relatively small deposit, but quite good grade and a very good leaching ore. I was involved, along with John Prochnau, who was a local manager for American Selco here in the U.S. American Selco is the American unit of Selection Trust, a London-based firm. They discovered three of these deposits. They were relatively close-based. And I got involved in heap leach testing and pilot scale work, and again, to determine the characteristics of the ore so that we could zero in and do a credible job of designing the commercial facility.

After the Brits got more involved in the project, they decided to bring in a consulting firm, Bechtel Engineering. Once Bechtel was involved in the project, I became disassociated. Bechtel designed the plant for them, and it got into production. I was there for the mine opening. They put thirty-some million dollars into that project, which was

probably three times what it could have been done for. Accordingly, it would be my guess that it wasn't a financial success, but I don't have the numbers, really, to back that up. I do know that with Bechtel's engineering, why, the plant was over designed, and there was too much money put into the project.

Is that a disappointment for you when you go in and know what you can do in terms of design, and then something happens like that where it's over designed, possibly losing money?

Well, that's a little disappointment, but I think it was a much greater disappointment to John Prochnau, whose team was responsible for discovering the deposit and its initial development.

I think it's a case of the owners, the British people, not being mine operators and not having the background and being talked into a contract with Bechtel. We here in this country know and have seen Bechtel's performance. They are very capable people, but when they build plants, they just can't compete price-wise. Their fees are exorbitant, number one, and they tend to over-build, and they build with union labor, which is far more expensive. So the bottom line is Bechtel has been put out of the domestic mining business.

They are now still in business, but operating elsewhere?

Elsewhere in the world, they're still involved occasionally with a plant. They're bigger in oil projects and pipeline projects and that sort of thing, particularly in the Arabian countries.



We're going to stop talking now about the consulting jobs. We're going to come back

to those, because there are still several that are of importance to Nevada. You have put together some thoughts on the changes over time that have resulted since the beginning of the heap leach process.

Well, there's been a phenomenal growth in both the size of gold deposits and the scale of operations since the beginning of Nevada's gold boom starting in the 1960s. Back in those days, I made remarks more often than once, certainly, that gold operations would never attain the size of copper mines. Well, how wrong I was!

Some of the current gold operations, particularly the breccia stock work and Carlin types, are at least equal in scope to the large porphyry copper projects. For instance, the Goldstrike Mine owned by Barrick is mining at the rate of 150 million tons per year. Their pit will exceed 1500 feet in depth, and this certainly compares with some of the largest of the copper mines. Another major change has been in the size of the surface mining equipment, some of which has increased as much as tenfold. In addition to the economies derived from larger equipment, great strides have been made in both drilling and blasting techniques, instrumentation, and new processing methods. On the other side of the coin, projects now often have to be content with years of permitting. When politics and environmental groups enter the picture, some projects never get off the ground. This has taken a severe toll on the domestic mining industry. The current Washington administration has done everything possible to destroy the mining industry. This is a dramatic change over the past.

And this is the Clinton administration?

This is the Clinton administration. We see an awful lot of withdrawals, particularly in the West here, the wilderness areas. We've

seen a recently unfavorable interpretation of mining laws. There've been, of course, major delays in the granting of permits, delays in granting of mining patents, more and more environmental regulations permits, new and restrictive toxicity standards for mine waste, bonding requirements. These have all impacted mining, and these are the areas where our government has made great in-roads in helping to destroy our mining industry.

So, in spite of the fact that mining has basically gotten bigger and better since heap leach technology was introduced, there has been a backlash in terms of environmental regulations, so that it has not gone as far as you think it might.

Well, you know, we've seen great strides in the technical area, in equipment, and great strides in discovering gold deposits, improved drilling techniques. Yes, we've seen major accomplishments, achievements in that area. On the other side of the coin is all the destruction that we've witnessed here due to our Washington administration, and in some cases, state administrations. Where they have tended to be anti-mining, they will essentially stop mining, or hinder it to the extent that they'll stop new development.

Colorado and Montana are having severe problems in terms of mining as compared to Nevada. Is that correct?

Oh, yes. Absolutely. It changed with changes in the administration. You get a pro-mining governor, and things will go well for a while. And then if you get an anti-mining administration come in, why, then you see no mine development during that period of time. So it's not just Washington. Of course, Washington can go either way, too, flip-flop back and forth, depending on their stance.

And then mixed in there is the market price of gold.

Well, yes. The price of gold has gone from well over five hundred dollars down to its current two-hundred-fifty, two-hundred-sixty-dollar an ounce range. We're seeing gold mines shutting down now due to the impact of the drop in the price of gold.

There have been quite a few lay-offs right here in Nevada, in fact.

Yes. I'm told that there's a lot of housing available in the town of Winnemucca, for instance.

So it really impacted there. This has been interesting for you. You started at the very beginning of the heap leach and watched it grow over these past years when you were a consultant. You helped work out some of the bugs of the process in various situations.

Yes. If we want to discuss the changes that we've seen in the industry as a result of heap leaching, we could perhaps elaborate a little on that. You know, without going out and canvassing the gold mining industry, it would be a little difficult to quantify the gold production, the profits derived from heap leaching, but suffice it to say that most surface operations today practice some amount of heap leaching. Operations like Smokey Valley at 600,000 ounces a year, Newmont's Gold Quarry, Maggie Creek, Hycroft, Florida Canyon, and many, many others—they wouldn't exist without heap leaching technology.

Two very profitable examples exist in Peru where Newmont and Buenaventura, at their Yanacocha operation, are producing 1.6 million ounces a year. And Barrick's Pierina, of similar proportions, is producing gold at cash operating costs in the range of forty to

one hundred dollars per ounce. The impact of technology, obviously, is great.

When I was working on the Silver Peak project, I was listening to a member of the staff at the Mineral Ridge Resources operation at Silver Peak saying to one of the old timers that we were talking to, "What you called waste, we call high grade now." [laughter] It really showed the contrast of what was a feasible operation from the 1930s up to the 1990s, for example.

Your involvement when you did your work there, was that under the owner prior to the Hycroft people that took over?

Yes. Mineral Ridge Resources started out, and then in just this past year, I think, Hycroft took over that operation. Closed down the Crofoot Lewis and took over the Mineral Ridge Resources.

Moved some of their equipment to Mineral Ridge.

Yes, an example of a small operation continuing to survive. Anything more on the heap leach process? It's had a tremendous impact all the way across, and when the micron-sized gold arrived, it's had some impact there, too.

Well, of course, most of the gold being mined is in the micron-size, fortunately. Well, I say "fortunately" because coarse gold is really not amenable to leaching. If you've got coarse gold, then you are going to have to come up with a process other than heap leaching. Gravity concentration typically is used, but in order to recover gold by gravity, you're involved with a milling operation, so you're automatically talking about a higher cost operation. So fortunately, most of the gold occurs in micron size, is what I'm saying.

One of the other things that has been around since the beginning of time is investing in mining operations. You have some comments on some of the opportunities that you've had in terms of investing.

The major projects I've been involved with, I've typically been able to acquire stock and ownership positions, and these have been acquired in a variety of ways, including contributions and equity capital, along with loan obligations, through performance on the job and brokerage arrangements and, of course, stock options.

And those have been in three situations that you've worked on?

Primarily three, yes.

I was just interested in that because I know stock is something that's been a major part of mining since the beginning of mining—creating stock, selling, buying, investing in it. That's one of the things that's still available to people, to be involved in mining in that way.

We want to start talking a little bit about the Nevada Mining Association. You were involved in that organization during some of your time here in Nevada. Would you just tell me a little bit about what you remember was happening with that organization?

Well, in the 1960s and 1970s, Nevada Mining Association, other than state political lobbying, did very little. But even during that period, why, MSHA [Mine Safety and Health Administration, U.S. Dept. of Labor] started to get involved in mining and our mining, and there were land withdrawals; the Forest Service [U.S. Dept. of Agriculture] and other federal agencies were starting to get involved in mining matters. Environmental groups were pretty well organized and were hacking away at us. Congress was try-

ing to do away with the 1887 Mining Act. So there were a lot of endeavors that the Mining Association should have been involved in and really weren't.

You mentioned that federal agencies were starting to get involved, including BLM and Forest Service?

BLM, Forest Service—particularly the Forest Service. BLM really didn't get involved that early, although today they're a big factor.

You had more dealings with the Forest Service in the 1960s and 1970s.

Forest Service was really getting involved with the mining companies and were starting to enforce regulations that would hamper the miners' efforts. The association in those days really was designed for the 1960s and 1970s; it wasn't suitable for the new era.

Things were changing in mining, but the association was a little behind?

That's correct.

Can you describe how it was designed? What was the make-up of the association at that point?

The association was made up of the mine managers of Nevada, which, when I was involved, consisted of ten or twelve people. They would meet not more often than, maybe, once a year. As a director, I personally felt it was almost a waste of my time attending the meetings. We contributed financially to the association on the basis of payroll, so the bigger operations provided the bigger contributions, and, accordingly, they ran the association. Kennecott and Anaconda were the big financial contributors.

And who was the head of Kennecott at that time?

Howard Winn. Ray Burch was the manager at the Anaconda operation in Yerington. However, I do want to say that I think they did an outstanding job in the area of Nevada legislation. They did a lot of work in that area, and that was about the extent of it, however.

I'm curious about the environmental groups. Do you have any specific examples of where environmental groups had a direct impact on anything you were working on?

I don't think the environmental groups were involved, for instance, in our operational areas. I think the environmental groups in those days were involved in Washington in the federal legislative areas, and they had a strong presence in that area then. It was later on that they really came out and would take on a specific project in the field and get involved in the local politics and work with the local environmentalists to attempt to do whatever it is they wanted to do on specific projects, but in those days, they weren't organized to that extent.

They were trying to make an impact at the federal level, Washington D.C. first?

That's correct, yes. Federal legislation, regulations. They were involved with the various agencies that had to do with promulgating regulations.

Verne Foster had done an oral history on her years at the Nevada Mining Association. Did you know Verne when you were involved with the organization?

Yes, I knew Verne. She always had a presence at the meetings, of course. She had a

very active presence there, and when the manager was absent, why, she essentially took his place, and accordingly, she had a lot of contact with the mining people.

You would have been coming at the Nevada Mining Association from a different angle—you as a director, Verne as an employee. But was there anything in her oral history where you had a difference of opinion?

No. I found going through her remarks that I would have to agree that she did a very good job. I think she had it down pretty pat.

Now you were involved with the Nevada Mining Association when who was the head of it?

It was Paul Gemmill, and then subsequently, Bob Warren.

So you were there during, primarily, the time Paul Gemmill was in charge.

Yes. So that was during the late 1960s and the 1970s.

So then it must have changed direction after you were a director?

It started to change after I got disinvolved. Mining was growing, and new mines were coming on the scene. Of course, new people were coming into the organization. Times were changing, and it was shortly after I left that they decided to form committees. Each committee, of course, had a specific area of endeavor. There were no committees when I was there. Then, the other big change had to do with bringing in the supply houses, people from the supply area—allowing them to be members and participate in the operation of the association. That was a major benefit, I think, that should have been done much earlier.

You felt that they had something to contribute?

Yes, an awful lot to contribute, because a lot of these suppliers depended almost solely on the mining industry, and they were people that got around more than the miners did, and they had better access to the public. They were based, for instance, in Reno, whereas the miners basically were based out in the hills and didn't have access to . . . couldn't communicate as well. So I think that the association was very remiss in not bringing those people in much earlier and giving them a voice in the business of the association.

They were kind of like a communication network, then, because as suppliers, they were going around between all the different mines, and also dealing with the public.

Public, yes, and some of them, of course, had access to the politicians. So anyway, the association today, I think, is a far better association than we had in those days.

Yes, they do quite a bit these days with the public service and research and all kinds of things.

Education. They have various committees, and they're very active, and a lot of people are involved. As opposed to the days that I was involved where we had, at best, a dozen people.

One of the things that you mentioned is that you'd like to go back and add some information about Hycroft. So why don't you bring me up to date on Hycroft?

Well, I got involved with Hycroft in 1985. I had been involved in consulting work with Granges Exploration on a gold property in California. About that time, or probably just

somewhat prior to that time, Homestake Mining had drilled a property located at Sulfur in Humboldt County on claims owned by the Crofoot family. After approximately one hundred holes or so, they were looking at a very low-grade deposit, and it didn't fit their financial needs, so they dropped the lease on the property. Subsequently, the property came to the attention of Wayne Livingstone of Hycroft Resources, who then negotiated a lease with the Crofoot family, the underlying owners, and then presented the property to Granges. Granges then ended up taking control of Hycroft. Hycroft was a small exploration entity, who didn't have resources or the financial might to be involved in anything like developing a substantial property. Granges had the resources. They had substantial income, and they had the wherewithal to raise capital. I arranged, then, a contract with Hycroft to do a feasibility study and, if favorable, to manage the engineering, design, permitting, construction, staffing, and start-up of the mine. During that period exploration was under way, and they ended up drilling a total of 300,000 feet in 1,300 holes and defined a reserve of about 22 million tons with a fire assay grade of .028 ounces per ton.

And that was considered fairly low grade at that point in 1985?

That's true. I mentioned fire assay grade because they also did what we call a cyanide-soluble assay, and the cyanide-soluble assay would probably equate to more like a .018 ounces per ton, which is more indicative of what a heap-leach process would recover. So it was quite a substantial difference between a fire assay grade and a cyanide-soluble assay.

Explain to me why each would be used, then. You found the grade through the fire assay, and yet this is a leach operation?

Well, with this low a grade, we knew if it was going to make a mine at all, it was going to be heap leach. The fire assay grade is the total gold content and is a very reliable assay. It's reliable limits are very specific. Cyanide-soluble assay is more indicative of what you would get from a heap-leach operation, and it's not necessarily all that reliable. Depending on the nature of the ore, the cyanide-soluble assay is a quick test-tube type of assay which can vary according to the procedure used. It can vary. You can do a cold assay, you can do a hot cyanide assay, and you'll get variations in the different techniques, but it plays a very important part in determining the economics of the project. Without the cyanide-soluble assay, the fire assay really is not going to tell you what you're going to recover. It'll tell you the total gold content, period, but it's not going to be very indicative of how much gold you can extract from that ore.

So then you get down to dollars and cents, and bottom line, your cyanide-soluble assay is the one that's going to make the big difference.

That's the one that's going to be more important. Following that, we would do metallurgical test work certainly on larger scale than test-tube-size assays. We would do leaching tests in columns and might do pilot-scale leaching tests, which then would zero in pretty close on the real numbers that you would expect from a commercial operation.

We got through the feasibility study, and the Granges people got involved in raising capital. In 1986, they purchased the adjoining Lewis property, which was being mined by the Standard Slag Company. They paid \$4.1 million for the property. Standard Slag was operating there on the northern end of the deposit under a lease from Lewis.

So Granges now had both the Crofoot leased and the Lewis property purchased?

They purchased the Lewis, so they had the total deposit. Subsequent exploration on the Lewis property developed an additional reserve of nine million tons. The combined waste-to-ore ratio from the two properties was 1.2 to one. The construction on the Crofoot property started in June of 1987, and production commenced in February of 1988, which was about thirty-four months after the first Hycroft hole was drilled. I was involved through the construction and the start-up.

We discussed some of the details of the plant, but going back over some old reports, I've been able to add to what we talked about earlier and will probably be a little more accurate in some of the details. I'll talk about the details of the plant. The plant was designed to produce and process 17,000 tons per day, of minus three-eighths inch crushed ore by heap leaching.

The heap construction was unique. Ore was conveyed directly from the crushing plant to a 3,500-foot long overland conveyor. This conveyor transferred ore via tripper to a 1500-foot long shiftable conveyor at right angles to the overland conveyor. The shiftable conveyor transferred ore, again, by tripper to a self-propelled, track-mounted stacking conveyor.

Now, when you say an overland conveyor, is overland a brand name, or is it a description of the type of conveyor?

Well, an overland conveyor is a conveyor that is transporting ore, in this case, right from the crushing plant down the length of the heap, but it doesn't get the ore onto the heap. It transports it overland along the length of the heap, and from there the overland has this tripper on it which runs on rails. It runs the full length of the conveyor, and it gets its name, tripper, from the fact that it's designed to take the ore off of the

belt and put it onto a transverse conveyor, which then operates on the heap itself. In this case, this was a shiftable conveyor, which meant that it also could run the full length of the heap.

It shifted by means of a dozer and some attachments on the dozer which fasten itself to the conveyor, and by means of the tractor walking parallel to the conveyor it drags it along three feet per pass. It would shift it, in this case, about 100 feet, and it would do that in a period of about a shift or eight hours. Now, the shiftable conveyor doesn't stack the ore. It transports it out to a stacker. And again, a tripper was required to take the ore off the shiftable and put it onto the stacker. The original stacker at Hycroft was a self-propelled, track-mounted unit, which stacked ore over a hundred-foot width. I think I described previously here in some detail how that track-mounted stacker operated. We had mechanical problems with that. It was a custom-made unit, and because it was custom-made, I guess it had some faults, in any event. It was modified, and after modification, it still had problems. Eventually, we went to a radial-type stacking conveyor, which had been planned for the system in the event that this custom-design, track-mounted stacker didn't work. So we had to fall back to plan number two. The stacking conveyor, then, was utilized throughout the life of the operation. I think there was a lawsuit instituted against the maker of the custom crawler stacker. I can't recall exactly—it was after my time—but they ended up getting some compensation from the manufacturer of the stacker.

Because it didn't work. It had a guarantee on it or a warranty? [laughter]

Well, that detail, I'm not sure, now. I would imagine that there was some measure of guarantee that the thing wouldn't fall apart and this sort of thing. In effect, that's what happened to it. It did fall apart. It was poorly

engineered and poorly manufactured. So after two major efforts to correct the problem, it still didn't function properly. It also turned out to be a safety hazard. So, we had it planned that if it didn't function, we would go to a radial stacker, but the radial stacker wasn't really what we wanted. We wanted to be able to place the ore—and I described that earlier—in a different manner, and that was never achieved.

I'd say after the entire initial leach area of 3,500 feet by 1,500 feet was covered with a number of lifts to its ultimate height, the overland conveyor, then, was extended. The ultimate length—I believe it was extended another 3,500 feet. Essentially doubled. I'm not 100 percent sure on that, but I know it was extended, and I believe it was another 3,500 feet. The operating cost of this system is probably less than one half that of a truck hauling system. It was a very important element in the operation.

Were you aware of any other systems that had been set up similar to this with the conveyors in order to keep the operating cost low for a low-grade ore operation?

Well, there's been quite a number of operations, of course, going in with conveying systems, but the conveying systems some were utilizing were cumbersome compared to this, I'd say, far less efficient. More efficient than truck haulage, definitely, but not to the same extent this system was. These shiftable conveyors were used in Germany in their coal operation and had been perfected there and had been applied in a couple of other operations in the U.S. Two others that I know of.

So, when you put this system together, you had high hopes for this custom-made overland conveyor to work well in this operation. It would have been a real cost reduction, had it succeeded?

The system worked with the exception of the propelled stacker, in essence. It's only the stacker that didn't function. The other elements of the system performed up to specification. There was no problem. Worked great. Since the stacker was a new piece of machinery, custom designed, we couldn't totally rely on it, and that's why I say we had a back-up system to go to. In other words, these radial stackers are essentially off-the-shelf machines. You can go out and buy one any day, almost.

So they had been tried already and proven.

Yes, and been successfully used in many, many applications.

But that was the part that you wanted to do differently.

We wanted to stack in a different manner. I addressed that, I think, in some detail before. And it had to do with percolation of solution. We talked about the classification that you generate with the radial stackers.

Yes, for the details on the operation, the pregnant solution in this operation utilized the Merrill-Crowe zinc precipitation process. The plant produced annually about 100,000 ounces of gold and 200,000 ounces of silver. Construction manpower peaked at 150 people, and operation required about 200 at start up. It was a good-sized operation. At the point when the project was up and running, why, I turned it over to others.



You mentioned that there were some gold thefts at Newmont while you were at the Cortez Mine, and this was something that you were aware of not firsthand, but secondhand. I'm interested in discussing this, not only what you know of it secondhand, but also how it relates to security measures.

So maybe you could start by just telling me what happened. Let's orient ourselves in time, since we've been talking about the Crofoot-Lewis operation.

Yes, this would be somewhere in the time frame around, I'd say, 1973, 1974.

And this was while you were still at the Cortez?

Yes, that's true. As I recall, in those days—and perhaps even so today—gold sales were monitored by the federal reserve. So any time there was a shipment of gold from a mine, the paperwork had to be filed with the federal reserve to report the amount of the sale and who it was sold to, so that the government had a record of the movement of the gold. This didn't involve just the producers of gold, but apparently it involved jewelers, as well. The jewelers bought raw gold, or if they even bought refined gold, their handling had to be reported, as well. Apparently, there was a jeweler somewhere in the Sacramento area that was reporting substantial quantities of gold transactions, which increased dramatically over what he had been reporting. Apparently, the feds picked up on this and decided to contact the jeweler. They determined that the people who were selling him this gold were from the Nevada area, and I guess they nailed it down to where they came from and perhaps even their names.

So the feds now had information that suggested that gold was being stolen from the Carlin Gold Mine. So they contacted Newmont's head office in New York, and the details of what transpired from there, how they accosted the people involved, I don't know. It was a conspiracy, and I think it involved three people, one of which was an assayer at the mine. Another was the refiner, and some other person. They were stealing, predominantly, gold precipitate. The refiner, of course, had access to the precipitate, and

he would have to get it to the third person involved. He placed the precipitate at some location where the third person was able to get to it, maybe after hours or a convenient, appropriate time. In the attempt to hide the loss from management, the assayer was doctoring his assays to hide the gold theft. So this apparently had gone on for some considerable period of time. Anyway, the trap was laid, and these people were subsequently charged with gold theft. That was one instance of gold theft in Nevada during my time.

There was a second one, and I was more involved in the second one, because it happened at the Lewis Mine shortly after the purchase of the Lewis Mine by Hycroft. The lock-up of gold at the Lewis Mine was a pretty "Mickey Mouse" lock-up, because it was a steel box that was out in the yard in the open, and the box wasn't really all that secure. It was a box that was actually bolted together. So one night, employees decided to go out there and unbolt the box and make off with the gold that was in it. [laughter] There were probably about three people involved, as well, in this situation. They ended up taking the gold to an assayer in Winnemucca, attempting to sell it. This was reported to the authorities, and so it wasn't too long before we knew, of course, what had happened. The gold was gone. It wasn't too long before we knew who had done it, and they never did sell the gold. The gold was actually hidden, and ultimately, it was all recovered, so there was no real loss involved.

What happened to the people who stole that gold? Were they charged? In the old days, this would have been called high grading, right, when people walked out of the mines with the gold?

Yes, high grading. Well, this all happened after I was away from the project. I know the gold was recovered, and I would imagine they were certainly charged. It seemed

to me that one of the people made off to Mexico, and I'm a little fuzzy, even on that. I don't recall the details of what happened to these people.

Could you tell me a little bit about the security measures that were necessary at the Cortez Mine, what security measures you had in place to prevent this type of thing?

Yes. We had pretty elaborate security measures. One important consideration was not to be routine in the manner or timing of handling and shipping. So people would never know when this was going to take place. If you were routine, you did it on a certain day at a certain time of the day. People could plan, and you might be subject to a hold up. So it was done at different times of the day and different days of the week, and then when shipping was done, it was done by different means. Our gold, at that time, was being sold to Englehardt on the East Coast, so the product was transported by air from Elko, by commercial aircraft. We had to ship from the mine to Elko, and we did that in different ways. We did it sometimes with a company owned vehicle. We would do it with small, chartered aircraft, for which we had a landing strip at the mine site. We'd do it occasionally with a helicopter. Typically, when we did it over the highway, we would notify the highway patrol or the county police, and we would have some sort of backup protection in that manner. Another method of shipping, of course, was by armored car, going to the armored car service. So without getting into the detail of exactly how we did it, we had different ways of shipping, and we would vary it.

The local security in the plant was to have at least two, and sometimes more, persons involved in the safe or vault combinations. Certain people had access to the vault, but within the vault, we would have a safe where we put the high-grade product. It would be a different person or persons who

would have the combination to the safe within the vault and had access to the vault. So it took a number of people to get access to it, number one. That was a measure of security right there. We would change the combinations, and then we would also change the people who would be involved in the security of the gold.

We also had alarm systems, and if these alarm systems were triggered, they would be relayed to key managers during off hours and off site, actually into their homes, through the telephone systems. On one occasion, we utilized a radio system for that purpose. We had guns available within the plant to let outsiders know that they might be subject to employees using the weapons in case of an armed hold up. Not to say that we would necessarily use the guns, but they were there. It would be, perhaps, more of a deterrent. There were people who knew very well how to use them.

These were employees, not outside security?

We really didn't have any outside security.

OK. All right. This is interesting, too, because most of the mines in Nevada are out and away, probably under the jurisdiction of, what, county sheriffs?

County sheriff, right.

So I'm thinking that security would land directly on the mine operations and would not have steady county coverage.

Yes. We didn't rely on county security whatsoever. We took care of that ourselves through these various means I've mentioned. We wouldn't necessarily want this kind of information to go outside of our operations, anyway.

So, in terms of working with the county sheriffs, did you have any coordination with them at all, other than sometimes on the shipping with the sheriff and the Nevada Highway Patrol?

Well, actually, you know, Lander County is a very small county, very small population. Accordingly, the protection that they could offer is really minimal, so we didn't really rely on it at all. We did rely on the highway patrol because the highway patrol, of course, is far more efficient, had more equipment and people, but the highway patrol wasn't all that cooperative. They were more concerned with catching speeders out on the highway than they were with giving us any kind of protection.

They had other priorities.

Well, in those days, of course, we had the fifty-five-mile-an-hour speed limit, and they indulged in that, and that was essentially where they spent all their time.

That was a big change for Nevada when that went in, because my understanding is that prior to that, there was no speed limit in some areas.

There was no speed limit, and out on those roads down in Crescent Valley, they all probably drove seventy-five, eighty miles an hour. I can recall one case where one of our people got caught speeding, and this was down within a couple of miles from the mine site, which was forty miles south of the interstate. I made a point of calling the local superintendent based in Elko one day, and I made the comment, "You know, we request frequently this protection over the highway when we make our gold shipments." And I said, "Typically, you don't give us but very, very occasionally, maybe, some service, but more frequently, you don't." I said, "But you send your people down forty miles off the

freeway to catch someone that's going a few miles above the fifty-five-mile-an-hour speed limit."

So when I brought that up, he said, "I'm going to look into that." He said, "This patrolman had no authority to go down to forty miles off the interstate to trap people down in your county." So I got a little satisfaction, I guess, out of that phone call. I think the speeding ticket was forgotten about.

It's so interesting when you think about Nevada having no speed limit, because there are such vast distances in Nevada, both for transportation and security. It creates particular situations that a mine operation has to deal with.

That's true, very true. We were always concerned about that, and this is why we frequently used small aircraft for the shipping into Elko.

You know, we talked about some of the more minor consulting assignments here, but we talked about three or four of them, I believe, and there were dozens of them, but most are pretty minor.

Did you want to mention some of those today?

Well, I can just name some of the companies. I think somewhere here I've got a list of some of them.

These are the ones where you played a minor role, but it gives some sense of what operations were going on in Nevada.

Yes. These would involve typically a matter of a few days. When you visited a site, you would write up a report on specific items. So no major involvement in these. Here goes: one was the Montgomery Shoshone, an old mining operation located out of Beatty, Nevada, which Saint Joe Minerals were involved with. That subsequently became known as

the Bullfrog Mine. That's gold, and that mine changed hands over the years. The last operator there, as a matter of fact, may still be operating there. I think they're in the process of shutting down, and that's Barrick Gold. Then there was the Talapoosa, which is located probably twenty, twenty-five miles east of Carson City.

There's the Candelaria Silver Mine. Candelaria was a very old and substantial silver operation. That's down south of Hawthorne, and that was put into production by Occidental Minerals. I was involved prior to the time they put it into production. I talked with Occidental Minerals along with a couple of partners of mine with the object of putting it into production for them, and then much later on, I was involved as an expert witness in a lawsuit that Occidental Minerals and an underlying owner were involved in.

Then there was the Willard operation, a small mine just east of Lovelock. The Willard had been drilled by Santa Fe Pacific Minerals, a division of the railroad. They determined that it was too small to get themselves involved with, and they put it on the market. My only involvement there was as a potential buyer. I made an offer, but someone else offered more money for it. They subsequently went in and mined it out.

There was the Relief Canyon Mine that was developed by Lacana. Lacana put it into production, lost money, shut it down, and it went onto the market, and again, I was one of the people looking at it. I never had an opportunity to place a bid on it, but the N.A. Degerstrom organization put in a bid on it and ended up with it. They resurrected the operation and did quite well with it. Relief Mine was located near the Rochester Mine. That's in the Lovelock area.

Going back even earlier, I had some involvement with a company called Pancana and Polar Resources. Those properties, subsequently, were acquired by Newmont and Barrick. They were in the Carlin area.

Another project I investigated was the Osceola, an old placer mining district east of Ely. Nothing has come about there. The Osceola was an old placer mining district that probably goes back to at least the early part of this century, an extensive deposit, but again, pretty low grade. Nothing has transpired at Osceola since then.

Then there was the Sterling Mine, which again, we're back in the Beatty district, which was a small operation, both surface and underground. The Sterling Mine was operated for a good many years and was managed by Greg Austin, from a prominent mining family here in Nevada.

Another one I have here is Hog Ranch, which was an open pit, heap leach operation north of Gerlach. I recall being on the project on a couple of occasions.

Then there's the Goldstrike Mine. This one is over in California in the Lake Almanor area, close to Canyon Dam. The operator at that time was Sunbelt, a subsidiary of Public Service of New Mexico. It was called the Goldstrike Mine.

I haven't attempted to be chronological here, so they span quite a number of years beyond the Cortez days, all the way up to the time I spent with Hycroft. It would be in the 1970s and 1980s.

So this gives some idea of all the exploration and interest that was going on in the state, some of which went on to become operating mines and some which just didn't work out.

Yes. Most of what I've mentioned here, have seen production, or have been operating mines.

Any others that we should mention?

Yes, Round Mountain very early on, actually prior to production and then during production, as well. I was involved during the very preliminary exploration and then

later on as a consultant during early operations for one of the minor partners, Felmont Oil. That's gold, and of course, that's still operating as a very substantial mine, currently producing about 600,000 ounces of gold per year, operating at about 45,000 tons per day, so it's a very big operation. It's heap leach, and for many years, they operated with an on-off pad type of leaching situation. We discussed this on-off pad versus dedicated pad matter. They are, I think, still using the on-off pad, but it's substantially a dedicated pad operation.

A very significant producer still today.

Oh, very significant producer. Those are some of the ones. There were many others that were outside of Nevada, and foreign ones.



Don, you have some information for me on carbon and columns process, starting with some background information.

Well, to begin, we can talk a little on the history of the use of carbon. It was in 1949 that the Carlton Mill in Cripple Creek, Colorado, was custom milling district ores using various milling procedures, including carbon and pulp. As near as I know, this was the first commercial use of carbon and pulp, and then, in 1973 Homestake's Mill in Lead, Colorado, converted their slime leaching in plate in frame pressure filters to carbon and pulp, using agitator tanks. That's a little on the history of the use of carbon. I think earlier on I mentioned that carbon was used in a plant in South Africa called the Modderfontein or Golden Dumps. I went to South Africa and looked at that plant. Then I decided that we'd use the carbon and pulp process at the Pinson Mill.

Both of these—the Carlton Mill and again at Homestake—used desorption of carbon,

using crude Zadra-type electrolytic cells, in which gold was plated out on steel wool. Of course, we're going to talk about carbon columns, but I think we also used carbon-in-pulp, and that's where carbon first got its use, was in pulp, rather than these columns. These columns were researched by the U.S. Bureau of Mines in Salt Lake City. The people involved were George Potter, Harris Salisbury, Joe Rosenbaum. Joe Rosenbaum was the director of the facility. They were issuing reports as they were doing their test work, and about the same time we were contemplating heap leaching. This goes back to the Cortez days. We were contemplating heap leaching and picked up on the bureau work and decided that carbon columns would be useful for processing heap leach solution. That would have been 1968 till 1976. At least, that's the period that I was involved there. In 1976 we ran out of ore and put the plant in moth balls.

We built the plant in 1968 and started processing the end of 1968. Carbon columns, to describe the apparatus, are round tanks fitted with a false bottom, which is perforated to distribute upward-flowing solution uniformly through the cross section of the tank. The upward flow rate of solution must be sufficient to expand the entire charge of column, but not carry the carbon out of the tank. Expansion of the carbon bed is not critical and can range anywhere from approximately 20 percent to as much as 100 percent. The top of the column is fitted with a peripheral overflow launder with an accommodating discharge pipe or outlet. Columns are operated in series, the number required being a function of the desired gold content for the barren solution. It is common to have the train of columns staggered in elevation so that the solution flows by gravity through all columns by means of interconnecting pipe.

The flow rate through the circuit is rather critical. If too low, solution will channel or short-circuit through the carbon bed, and if

excessive, carbon will overflow the tank with the solution. Carbon is supplied at different mesh sizes. Each mesh size requires a specific solution flow rate, designated in units such as gallons per minute per square foot of the tank's cross section. Finer carbon requires a lower flow rate than coarser carbon. At intervals, dependent on the carbon gold content of the first carbon, carbon is removed from that column, advanced from each following column, countercurrent to the solution flow. Eductors or special pumps are used to advance carbon to minimize abrasion losses. Column circuits require rather critical design parameters, but are inexpensive to build and operate.

Do you want to talk about this flow rate? Was this still in an experimental stage, when you began working with it, in other words, trying to find the exact rate for the finer and the coarser?

Yes. Although, the bureau had done preliminary work. I would say that we probably elaborated on that work, using different types of carbon, different sizes of carbon, and, of course, eventually, we got into commercial-size tanks and apparatus, so that the process was considerably different from the scale of equipment that the bureau had been using.

There's some experimentation that you have to go through, going from the test sizes into the commercial production?

Yes. For instance, in handling the carbon, again, I referred to abrasion losses. The problem with abrasion of the carbon is that the fine carbon that abrades is lost. You can't recover it. It just goes out of the circuit of the solution, and it contains gold. So in handling that carbon we used different types of pumps. We used these eductors that minimized abrasion losses.

Tell me what an eductor is.

I wish you hadn't asked that.

[laughter] Can you just give a general description?

An eductor is something that's fitted into the plumbing, into the piping, and it uses mode of water from a pressure source to "educt" or suck solution from the tank. In this case it would be educting carbon in an aqueous slurry, using a fresh source mode of water and sucking it out of the tank and then into the plumbing system and carrying it to, say, the next stage of the your columns.

You did do some experimentation with the types and sizes of carbon?

The other element that we had experimented with was this perforated false bottom, the method of diffusing the solution throughout the cross section of the tank, in order to expand the entire column bed. I mentioned that if your solution flow rate is too low, you'll get a channel of water solution coming up through the bed of carbon, and you're not loading the carbon then. So you've got to have all of that carbon agitated and floating in the solution and getting contact, so that you load the carbon up appropriately. The method we selected was this perforated plate. Others had experimented with just a gravel bed to disperse the solution. One of the problems we had with the perforated bed was that if you had a loss of power, for instance, your carbon would settle down and go through these perforations and end up in the bottom chamber of the tank, which you really didn't want to happen. You didn't want the carbon down there. You wanted the carbon above that perforated plate false bottom.

We ended up with putting little disks over these holes, welding little disks on top of the hole, but leaving an annulus around the plate

in the false bottom, so the solution would come up, but then, when you lost your power and the carbon settled down, it wouldn't drop down through the holes. So these are things that we experimented with and refined. I haven't been involved in this stuff now for a dozen years or so, and perhaps people have come up with better applications.

But this is important, because it gives a sense of the early stages and what kind of experimentation you had to try to make things work.

Sure. These are details that, I think, the bureau didn't get themselves involved with. They were involved in sort of a bigger picture, and we were involved in the operating, refined elements. I think that that pretty much sums it up.

And was the first place that you worked with this at the Cortez Mine, the Pinson Mine? Can you give me a little bit more detail about the application of this?

Yes. That was where the columns were first used, at the Cortez operation. Newmont also built a column, a fairly large column at the Carlin gold mill, as well, at about the same time. They were experimenting with carbon columns. As I recall, instead of having, say, a series of five separate columns, they had one tank that was separated in segments, so the solution would flow up through one segment. We also experimented with that type of tank, too—one big column, rather than a series of columns, but that was the first application of carbon columns.

Now, resin-in-pulp columns are used in the uranium industry, but resin-in-pulp carbon reacts differently, and it was really a different type of tank, as opposed to the carbon columns.

Newmont was working with one large tank, and you were using several smaller tanks.

Did you find that one was more suitable than the other?

We actually used both at Cortez. At the Gold Acres plant we used a series of columns. At Cortez we recovered solution from our tailings pond, and we put that solution through a multi-stage column. The solution from that multi-stage column removed a little bit of gold that was still in that solution. That solution then went up to our heaps, when we started heap leaching. We really had a truly barren solution going to the heaps or heap leaching, and it was designed, too, not necessarily just to recover gold, but it was an experimental procedure on our part for the use of carbon, using the multi-stage carbon column. I don't think the multi-stage carbon column really took off. People generally went to individual series of columns, typically, four or five or six. I think we've covered the carbon columns.

Did you also use the carbon columns at the Alligator Ridge?

We used carbon columns with a pilot plant. I was involved with a pilot-scale operation to determine the metallurgy of their ore, and we stacked a few thousand tons of ore and heap leached it and used carbon columns for recovering the gold. Subsequently, a commercial plant was built. They went to carbon in columns.

Did the carbon in columns change over time, while you were working in the gold industry here in Nevada? Were there further changes or refinements in the system that you saw from your experience?

Well, there were some. I'll mention one specific modification in the process that I can recall that differed from the system that we devised and used, and that was the use of detached tanks. Instead of a gravity flow through a series of tanks that were plumbed

together, this procedure used a series of tanks, probably five, that were all set in the same level, so that each one would have to have a separate pump, and these tanks could be shifted around. In other words, one tank would be moved out, and it would be emptied, and the other tanks would be subsequently moved over, and the tank that was moved out with the loaded carbon, the carbon would be emptied out of it, and it would be filled up with new carbon, and then shifted back into its appropriate position. I think that was kind of a cumbersome procedure. The other would be more efficient. With the multi-stages of columns, you only needed one pump. You used gravity to go from one column to the other.

We wanted to go into a little bit of detail about the Pinson Mill—the design and process and what was unique about that.

Well, the Pinson Mill used the carbon and pulp process, which I think I referred to earlier. Some of the history of the use of carbon and pulp, referred to the Cripple Creek and Homestake's use of carbon, but I'd say that the Pinson plant was unique in that we started out with that as carbon in pulp process.

Rather than a plant that had been changed?

Yes.

Don, you had a couple of other points to discuss today. I'll just let you introduce them.

Well, I'd like to discuss this desorption or stripping of gold from carbon. Desorption can be done either at ambient or elevated pressures. Both methods are used—there's little preference one over the other. At ambient pressure, strip solution temperatures are usually kept as close to boiling as is practical. Under pressure, temperatures can be

elevated so that stripping time can be significantly shortened. Strip solutions cycle to metal-recovery circuits, such as electrolytic tanks, which are most common, or to precipitation units. Solution reagents used are normally cyanide at about three and a half pounds per ton, and caustic soda at one percent. Alcohol can be added to enhance strip performance. Desorption columns are usually constructed at a height several times its diameter. The tank is filled or packed, since an expanded bed like adsorption columns is not required. Solution flow is normally from the bottom to top at a rather slow rate of about two and a half bed volumes per hour. Strip solution is cycled to the electrolytic tank for plating of gold on steel wool cathodes. Stripping times range from twelve to twenty-four hours for pressure circuits, and at two to three days for atmospheric pressure.

At this stage, I guess, we could talk about electrolytic tanks, which are rectangular in shape, measuring typically three feet by three feet in cross section, and a somewhat longer dimension. They are typically constructed of non-conducting material with bus bars connecting to the alternating anodes and cathodes, which are arranged in a vertical configuration, similar to the plates in a car battery. Anodes can be perforated stainless steel or carbon sheets, cathodes are constructed of steel wool contained within perforated plastic containers. Use of cathodes similar to steel plate anodes requires that gold be scraped off of the loaded plate. Pregnant solution is diffused through the tank to minimize short-circuiting. The exiting or barren solution recycles to the desorption column. An efficient tank will recover as much as 98 percent of the gold in a single pass. That's the electrolytic tank.

That's very efficient. Can you relate where you first saw or worked with the desorption, the stripping? Was that the end of the carbon and column process?

No, this is the circuit that follows the carbon and pulp or the carbon column circuit. This now is after we've loaded the gold in either the carbon column circuits or the carbon and pulp or carbon and leach circuits. This now is the next step: remove the gold from the carbon. We've talked, I think, earlier about regenerating that carbon before it goes back into use again. This is the next step from the adsorption of gold onto the carbon, and using the electrolytic tanks to recover gold from the strip solution. I mentioned briefly that strip solution can also be precipitated, and I can recall one plant that used that process, but it's more typical to use electrolytic tanks.

Were you using this at Cortez?

We were using the electrolytic process at Cortez. I will add that these electrolytic tanks ran at about two and a half volts of electrical current, and the current, depending on the load, was somewhere in the neighborhood of twenty to twenty-five amps per cathode, and that will change depending on the type of cathode or the makeup of the cathode.

In about 1973 at Cortez we ran experiments with lab scale equipment to combine in a single vessel both stripping and electrolysis. In this case, the loaded carbon was the anode. The test work proved the concept was practical. It was not optimized nor put into commercial use at that time.

You wanted to talk about electric induction furnaces.

Yes. The practice of using electric induction furnaces to refine cathodes was first used at Pinson. This proved to be a major advantage over other types of furnacing, such as are used for refining gold precipitate with its major environmental problems, which are heat and toxic gases from the other types of furnaces. Also, flue losses are

incurred. Major flue losses can be incurred with reverb and crucible-type furnaces. Well, induction furnaces have been used extensively for final gold refining, such as in the various refineries. Using our cathode product required pioneering with technical help, which we obtained from the Colorado School of Mines. Induction furnaces do not lend themselves to refining a precipitate, because of its bulk and lack of conductivity.

So, you were working with the Bureau of Mines out of Salt Lake City and the Colorado Bureau of Mines. Was there a reason why you were using out-of-state resources at that point? I'm wondering what was happening here in Nevada in terms of the Bureau of Mines and also the School of Mines. They just were not working on those particular things that you needed?

Well, in the case of the electric induction furnaces the Pinson metallurgist, Bruce Thorndycraft, was acquainted with one of the faculty members at Colorado School of Mines, and he was an expert in the use of induction furnaces. We gave him our product and said we would like to use an induction furnace, if that was possible. So he experimented using little lab-scale furnaces, and he had some problems, but he persevered, and he finally came up with a process. The problem with the steel wool was that it didn't have enough mass to start the process of smelting. We either had to start with a gold button, or else we had to kind of compact this steel wool, so that it would pick up this induced current, get this induced current going, so that it would melt. The process did use a minor amount of fluxing in order to oxidize the iron, but the big advantage in the electric induction furnace was the almost complete absence of any heat generated from the furnace, essentially little or no air required compared to these other types of furnaces, and the small space required. These furnaces are relatively small.

So, these furnaces were eliminating some of the environmental problems, even before that was required, in terms of heat and toxic emissions?

Well, environmental problems were solved, but the old method was a more expensive and elaborate system. We had to provide a lot of volume of air to cool the area in the refinery, and in the case of the reverb-type furnace, it required a lot of oxidation air, and because of all this air mass going through the furnace, you had flue losses of your product, which were actually taken out of the furnace up through a stack and had to go through a scrubber. Some of that gold would be recovered in the scrub-

ber, but you had this extra apparatus, which really wasn't required with an electric induction furnace, or, if it was required, it was relatively minor.

I think we've covered everything. I want to thank you. You've done an excellent job at describing some of the details of changes in technology that were going on at the time you were at the Gold Acres and Cortez and Pinson mines.

Well, it was a lot of fun, too. Very enjoyable work.

Good. I'm glad. Thank you.

JOHN GOMES

VICTORIA FORD: *Today is July 26, 1999, and my name is Victoria Ford. I'm here with John Gomes in his home in Reno, and we're going to be talking about his connection to mining in Nevada. John, let's start with when and where you were born, and tell me a little bit about how your family ended up in Oakland.*

JOHN GOMES: I was born in Oakland, California, in 1925. My father had been born in Battle Mountain in 1894. My grandfather, John A. Gomes, came from the island of Pico in the Azores in 1881 to Golconda, where his uncle, Manuel Gomes, who had helped build the Central Pacific Railroad, had homesteaded a ranch on the Humboldt River.

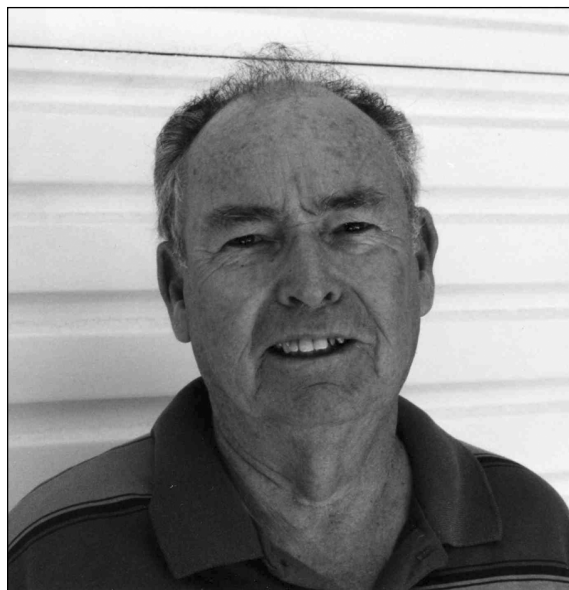
After they finished building the railroad, Manuel became the section foreman for the railroad at Golconda. He'd been on a Portuguese whaling ship, and he left the ship in San Francisco with two of his brothers. All three of them had worked on the building of the Central Pacific. Then, when the railroad was built, they each took sections. Manuel was at Golconda, and Antoine was at Colfax,

and the other brother, whose name was John, also, was at Emigrant Gap.

So then, my grandfather came over in 1881 with his mother and four sisters. He also came from the Azores on a whaler and landed in New Bedford, Massachusetts when he was eleven years old. Then his mother dropped him off in Golconda with her brother, and she continued on to Livermore, California, with the four girls, because the oldest daughter had married Joe Bettencourt, who would ranch at Tasajara, which is just out of Livermore.

The uncle had homesteaded the ranch by now. So my grandfather started as a buckaroo, as he called it, and the uncle had some cattle and cut hay and so forth, like many of the ranchers do today. About the time my grandfather was, say, late teens—seventeen, eighteen or so—the uncle sold the ranch and went back to live as a rich man in the Azores. So the ranch that he had homesteaded is now part of the Diamond S, which is a large ranch there in Golconda.

My grandfather hired out as a buckaroo and worked up at Paradise Valley on several of the ranches there north of Winnemucca.



John Gomes

He did some work in the hotels, too. He worked in the American Exchange Hotel in Battle Mountain as a cook, and he also picked up and learned cutting hair, being a barber.

So about 1891, I guess it was, he met my grandmother, who was a native of Canton, Illinois, and she was of Pennsylvania-Dutch extraction. Her mother's name was Rachel Shallenberger, but her father had died when she was young. My grandmother's name was Bailor. So anyway, they moved to Golconda because my great grandmother's brother, George Shallenberger, had a store in Golconda. So that's where my grandfather met my grandmother. They were married in 1891, and my father was born in 1894, while they were both running the American Exchange Hotel in Battle Mountain. I later found out through Don Warren's writing that the hotel was owned by another native of the Azores.

They all spoke Portuguese and had ties, I guess, with the mainland. The Azore Islands had been a colony of Portugal for I don't how many hundred years before, and some say it was a penal colony. [laughter] So all the Azorians may be descendants of prisoners.

My father was born in Battle Mountain. At that time my grandfather was the constable in Battle Mountain. A few years later he also ran the Golconda Hot Springs Hotel in Golconda and did cooking and bartending and what have you, to run the place. I guess my grandmother took care of the rooms and so forth. Then he decided to go into the retail business by starting a store, and he borrowed a thousand dollars from the bank in Winnemucca. It was from George Nixon, who later became a U.S. senator and quite a notable Nevadan at the turn of the century. So the store was a success. He handled mainly dry goods, men's furnishings, as well as some sundry items like tobaccos. He also had a bar called the Copper King right next to the store, and he had his barbershop there. So he could pick up money in three ways. [laughter]

This was in the 1890s, and that was a time when it was a little bit of a depression for the country, correct?

Yes. Nevada was on the downhill scale, so to speak, what with the Virginia City mines playing out, and the price of silver dropping. So, of course, the northern part of the state was not depending too much on mining at that time; it was more agriculture or stock raising. In that area, about the turn of the century, there were lots of sheep, and that's when many of the Portuguese came in, the same as the Basques, to herd sheep in Nevada. They had several large ranches. The Bliss Brothers had the four ranches up there, and the Golconda Land and Cattle Company, which was owned by Congressman Kent from California, had a whole group of ranches, also, between Humboldt County and Elko County.

I'm curious to know, did you know your grandfather?

Oh, yes. He died in 1946.

You mentioned Portuguese and Basque in the area. Did he indicate how well the Portuguese were accepted in the area? Did he talk about that at all?

Well, he never mentioned any discrimination.

So many people came in to build the railroad and to start that area, that there must have been a variety of different ethnic groups.

Yes. I know he did work for several, say, Anglo ranchers and got along very well with them. That's when he would tell stories. I know one of the stories he told was about when he was in Paradise, and they had a breakout of the tick fever, Rocky Mountain spotted fever. He was one of them that got the fever very early, had a light case, so he helped nurse a lot of the other men back to health. The hotel in Paradise was loaded with them, because the Spring City Mine was working at the time. He'd just run errands for them. They'd give him a dollar or something, and he never made so much money in his life, but he wanted to help the guys, too. Many of them died at that time of the spotted fever.

It was an epidemic that went through, was it?

Oh, yes. They probably didn't realize what was causing it those days. I don't know if they'd identified it with the ticks or not. Like I say, all the ranchers had sheep those days, and the sheep carried the ticks.

Do you know about when that happened? Would it have been before he married your grandma?

Yes, it was probably in the late 1880s, because he was just a young guy, he said, like seventeen, eighteen years old.

Well, he was very active in that area then, very much a part of it. He did ranching, and he ran the hotel.

Well, all at different times, but yes, I think he felt that the only future in ranching was if you owned one. [laughter] Because even today, ranch hands—cowboys, so to speak—don't make very much money.

So he could see that he needed to do more than just buckaroo.

Yes. Then when he married my grandmother, her uncle had been in business with a general store there in Golconda, so he felt there was an opening, and he did well in the store. They eventually ended up in California with the money they made. He had saved a hundred thousand dollars, and they came to Berkeley. He and my father went in together and opened a store in Berkeley.

In those days a hundred thousand dollars was very good money.

Yes, well, they had built an apartment house, also, in Oakland right on Lake Merritt.

So your father was born in Battle Mountain. Did he spend his young years in that area?

Well, he went to grammar school till the eighth grade in Golconda, of course. Then to go to high school, my grandmother had cousins or some relatives in Bellingham, Washington, so he went up there from 1907 to 1911, where he graduated from high school. Then he returned to Golconda and helped my grandfather in the store. In 1912 they bought a Cadillac—not as a show car, but to serve as a stage to run back and forth to Midas, because Midas was going strong then. Golconda was the closest railroad stop to Midas, so the people going to Midas would

get off there, and instead of taking the horse stage, they could take the motor stage. I think there were several people that ran the motor stages. My grandfather did, and that's what my father did mainly, because my grandfather was never that good a driver. [laughter]

So he ran the stage to Midas. In 1912 that would have been one of the early Cadillacs, too. Cars were fairly new.

Yes, I've got photos of that. Only been out about ten years.

So then how long did your dad stay around there?

Well, he stayed there, and he went in the army in World War I. So I guess that was 1916 or 1917, maybe, and then he went to France with Ninety-First Division. When he came back, he worked as a bookkeeper for the Golconda Land and Cattle Company in their ranches. So he was out at the Rock Creek Ranch just eight miles south of Golconda.

And then, like I said, my grandfather decided to sell out. My grandmother Lottie hated Nevada. [laughter] So even though in the store he made twenty thousand dollars clear in 1920, he sold out in 1921 for twenty thousand dollars, which is not very good for a business that generated that much income in a year. So anyway, she felt they had enough money to retire or whatever, so that's when they moved to California, where she had another cousin in San Francisco.

So then they were off to California, and your dad went with them?

Yes, and they started a store in Berkeley, and, like I say, built the apartment house. My father, George Gomes, got married in 1921 to my mother, Agnes, and I was born in Oakland in 1925. My mother came from

a family with a mining background. Her father had been a stationary engineer, a hoist man, and this type of thing, first in the mines in northern Michigan and Wisconsin. Then they went to Cripple Creek in the early 1900s, and she was raised, more or less, in Cripple Creek, Colorado. That was a big gold camp.

A couple of years ago, I was back in Cripple Creek, and they had the directories, I think, for 1906, 1907. My mother at that time was working for the telephone company, or maybe 1908 it was. Anyway, her name was not listed, but her brother was listed as a shift foreman at one of the mines; her father was listed as a hoist man at one of the mines; and another brother was listed as a clerk in the A&P store there. I don't think women counted in those days. [laughter]

They got married in California. Did your dad get involved in mining at any point?

Well, yes, in about 1903. We still have these claims in the family. They're out in the Gold Run Mining District, which is about ten, twelve miles south of Golconda, on the east flank of the Sonoma range. The first claims, my grandfather had given credit to some guys that had them, and they tried shipping lead silver ore, and they didn't make it. So they owed him some money, and they said, "All we can do, Johnny, is give you the claims." [laughter] So that was his start in the mining business, and these claims are the nucleus of the property that we have, that has been looked at by several mining companies and drilled. They have come up with small gold deposits, but we're hoping for more. We just got the property back from Cambior, which is a Canadian company, but with the price of gold the way it is now, it doesn't look too good. [laughter] It's about \$254 an ounce, I think, today. [July 26, 1999]

My grandfather passed these claims on to my dad and then on to me and my kids, because when he died, I was working for the U.S. Bureau of Mines, and I wasn't allowed to hold claims, so we had to give them to the kids.

Your grandfather never actually did mining then—he just held the claims?

Oh, he used to take a week off or something and go out and dig around. He had some of the shearherders that didn't have anything to do in the winter because the sheep were in pasture—couple of them from the Azores. He'd stake them, and they'd go out, and they ran a couple of adits in and did some work.

My father was probably more interested in the mining, because during the 1930s, they sold or lost the store in California. Well, with the Depression, they closed it in 1932, because they were losing money, like a lot of people were during the Depression.

So then my father came up and started working the claims, and he shipped some ore out, mainly lead-silver ore from two different places on the property—and probably didn't get rich out of it. [laughter] Probably just made enough money to survive. It was like wages in those days, they used to say. Eventually, when the Getchell came along, he went to work at the Getchell Mine.

So during the Depression era did you move out there with him?

No, only in the summers. We spent the school year in Oakland. On the claims he used to work, say, about eight months a year and come back home in November through March or so, the winter months, but he worked out there year-round at Getchell.

So then, when school was out, the whole family would go with him?

Yes, we did several years. We rented a place in Golconda, and it was only my mother and I. I had a sister that had passed away when she was twelve years old; she was a few years younger than me. My mother and I and father lived there in Golconda a couple of summers. My mother had a sister in Golconda, and they knew a lot of people there, because my mother had worked in Golconda for Reinhardt's store.

So it was sort of like coming home, because your family was known around there. Did you go out when your dad worked out at the claims?

Not till I was sixteen. In 1941 I was sixteen, and that's when the Crown Mill was running. He was mining oxide ore, which Crown Mill could take, and shipping it over there, which was only a half-mile haul or something, so we didn't really have any shipping charges. He'd have silver ore that would run ten to fourteen ounces of silver per ton.

How did he haul it that half mile over to the mill?

Well, we'd get a truck from Dodge Construction, which had the hauling contract, that hauled the ore from the pit down to the mill. It was the same company that did the hauling at the Getchell.

Do you know how he got that truck to come and haul the ore?

Yes, we'd just pay for it for the hours that we used it, which wasn't very much. He got a pretty good deal, because he drove it, and we loaded it ourselves.

Ten to fourteen ounces per ton in silver?

Yes, and then a small amount of gold, also.

Was that pretty good for silver?

Well, the silver was worth seventy cents at that time. He would ship between thirty and fifty tons in a month, so he wasn't making a lot of money. He drilled by hand, single-jacked, and, boy, did it all the hard way. We had to handle the muck at least three times before we got it into the truck, and we loaded from the stopes and then loaded at the station, because we didn't have a pocket. So we just hand-shoveled it into the skip, hoisted it, and then put it in an ore bin that was not a dumping ore bin. It was the same height as a truck, right off the dump, and we'd shovel out of that. So, like I say, we handled it all three times. Course, it was called a "Portuguese set-up." Do everything the hard way. [laughter]

It was very labor intensive for the amount of money that he was able to get back.

Yes, it was labor intensive, is right.

Did you like working out there?

Well, yes, I was only sixteen, and I could run the hoist and so forth and do the different jobs. Did a lot of mucking. [laughter]

Did he teach you how to drill and blast?

Yes, I learned how to. I never did get very good with the single jack—tried a few times—but I learned about loading the holes with dynamite and blasting and so forth, putting in the primer.

This was just you and your dad, or did he hire other people to help him?

No, it was just us. Well, then old Doc Walton, another prospector, had claims up above the Crown—and this is a story in itself. This man was a dentist, and he got the gold fever, and he moved up there. He'd been

a very successful dentist in the San Jose and San Francisco areas and had offices in both places. He was one of the original credit dentists. [laughter] They used to advertise on the radio, you know, "Come and get your plate for so much," and it's only ten dollars a month for ten months or whatever to get an upper or lower plate in those days. [laughter] That's false teeth. You could do it for credit.

He used to pay people to do the assessment work on his claims and so forth. Then, eventually, he decided to do it all himself, so he moved out there and became a real desert hermit, but Doc Walton came down and worked with us, say, from Thanksgiving to Christmas, because my dad had hit some good ore, and he wanted to ship it before Christmas. He was old; hell, he was probably sixty-five, seventy then, but he was very spry. He could single-jack, too, break the ore. He was the only one that ever worked with us. Instead of paying him wages, my father had a deal with him; he got a percentage of the profits that we made. I could tell more stories about Doc Walton, but we'll let that go for now. [laughter]

He was very much an interesting character. He was a Dr. Jekyll and Mr. Hyde, because out in the mining camp, or where he lived, he burned sagebrush and had a pretty primitive cabin and no electric lights or anything, of course. He always smelled like sagebrush. He'd wear clothes that were patched. None of the original pants were left—they were patched so many times. [laughter] But when he went to San Francisco and stayed with his nephew, then he would wear tailor-made suits and always be dressed to the hilt in San Francisco—just the opposite of what he was out in the hills.

Amazing. Where did he keep these clothes?

Well, he'd keep the good clothes at his nephew's in San Francisco. He might have had one suit there that he'd wear to dress

up. Of course, a lot of his clothes were left from the days when he ran the dental office, you know, and, like I said, he hired quite a few dentists to keep these two offices going while he went out prospecting and mining. Well, he did at first, and then he sold them out, because he wasn't there enough to really keep an eye on things.

You were working with your dad in 1941. About how long were you able to work with him?

Well, that was the main year; that was it, because the next year my father was working at the Crown Mine next door. He was a motorman in the recovery adit, where they were pulling ore from the glory hole, so to speak. An underhand stope.

What's an underhand stope?

Well, usually in a stope you work up and let the ore fall down on you. In the underhand they started on the surface, and they benched as they went down, and it got wider. It was a vein that was, oh, eight, ten feet wide. They'd make six-foot benches, and they'd drill six foot and blast, and the ore would fall down into a raise. Then they'd pull the chutes down below. I think the train that my father ran the motor on had like six or seven cars on it, and they'd load them and haul them out to where they were dumped in the bin. Dodge would come along and pull the chute there and fill the trucks up and take it to the mill.

This was the Crown Mine. Was the mill right near the mine?

Right. The Crown Mill was right near. The official name of the operation was the Adelaide Crown, but the Adelaide was the old copper mine three miles down the canyon. It dated back to the turn of the century, where a Scottish company, Glasgow West-

ern, put the money in it and ran a railroad from the mine to Golconda and had a smelter in Golconda. So I guess Roy Hardy, who bought the mine, was quite well known in mining at the time. He was the consulting engineer for the Getchell and was George Wingfield's brother-in-law. He decided to add the name Adelaide to it, and so Bill had made the district, which sometimes is called the Adelaide District instead of the Gold Run District. It became the Adelaide Crown Mine.

Was the copper mine still operating when you were around it?

No. It was closed down. The last the copper mine operated was in World War I, when the Yerington Mountain Copper Company came in and shipped a lot of ore down to their smelter in Yerington.

Roy Hardy owned the gold mine?

Yes, which was the original Crown. Wingfield actually bought five patented claims at the copper mine, so Wingfield owned them at the time.

So was your dad working for Roy Hardy?

Yes, at the Crown Mine.

Did you meet him or know him?

Oh, yes, I knew Mr. Hardy well. Roy Hardy—he was a large man, like six-two or six-three, I remember, and probably two hundred and some pounds. Two twenty. He had been a successful mining engineer in a couple of ventures at Virginia City in the Flowery District. I should know more because I read his oral history the other day, which the university has. When Wingfield started the Getchell, it was brought to his attention by Nobel Getchell, because they needed money and financing. That's when Hardy became the engineer for the Getchell.

There was a close relationship, of course, between the Crown and the Getchell. The Crown had very few shop facilities or anything, so if you had any major repairs, you took the equipment over to the Getchell, and they fixed it in the shops over there, where they had excellent facilities for the day. The superintendent at the Getchell, Fred Wise, supervised the building of the Crown Mill and was very instrumental in getting the Crown Mine started. The first superintendent was Carlos Wark, and he was the son of the mill superintendent at the Getchell. So it was like a family up there, almost.

So everybody helped each other out? It wasn't a competitive type of situation?

Right.

Your dad was working at the Crown in the mine or the mill?

Well, he worked first on the construction of the mill, and then he worked in the mill at the start. Eventually, they made him an assayer, and he did the assaying for awhile, but then he left in 1941 to mine his own ore. When he went back to the Crown is when he went to work in the mine as the motorman. He liked the mine foreman, Carl Frandsen, I think, better than he did the mill foreman. [laughter] Carl was a good guy to work for, he always said.

They had an electric engine, so to speak, and it would haul anywhere from five to seven ore cars. I think the ore cars were two-ton. So he'd run into the chute, pull the chutes, and he and another helper would fill the ore cars with ore and then take it out and dump it in the bin, so that the trucks could pick it up and haul it to the mill. It was only about a quarter mile from the mine to the mill. He liked working underground.

Did he stop working on his claims then after a time?

Yes. Oh, he might go over on a weekend—or Sunday—because they worked six-day weeks those days, and he might do a little work around, you know, if my mother didn't have something for him to do. [laughter]

They worked six-day weeks. Do you have any idea what his pay was for that?

Yes. I think, when I first went to work there in June of 1942, the miners were making seventy cents an hour in the laborers' and muckers' pay in the bull gang. What I received was five dollars a day. So that's, I think, sixty-two and a half cents an hour. Then in the middle of that summer, as the war was progressing and labor got tougher, then I was raised to seventy cents an hour, which is \$5.60 a day, and the miners were raised to eighty, which was \$6.40 a day. Now, everybody makes that in an hour. [laughter] Or much more.

The miners worked a six-day week. Everybody else—mill crew, the crushers, all of them—worked seven days a week. So I saved a lot of money that summer, because then, if you worked seven days a week, you got paid for eight days, because everything over forty hours was time and a half.

So you got the equivalent of eight days pay. Were you working in the mine?

No, in the mornings I worked in the assay office. I was the sample buckler. I'd prepare the samples for the assayer, which entails crushing them in a small jaw crusher, and then maybe getting down to, say, quarter-inch feed, and then running them through a pulverizer, where you grind them down to approximately two hundred mesh, minus two hundred mesh. Then you split them through a splitter so you're not just grabbing a sample out, because the assayer only needs thirty grams for an assay-ton or maybe two assay-tons at the most. So then

after you pulverize them, you put them in an envelope and take them in and put them at the scale for the assayer, and he would weigh them and mix them with a flux and so forth. I also did some other things in the morning—helped them mix the flux.

Litharge, which is lead oxide, was the major flux. Then you used flour as a reducing agent and sometimes soda ash. Well, on some ores if they were low in silica, you added silica, but these ores were all highly siliceous, so at the Crown we didn't. Sometimes you would add maybe a little fluorspar or something like that to help, depending on the ore. You heated this up to, say, two thousand degrees Fahrenheit or a thousand centigrade, roughly, and it would melt. The flour would reduce the lead, and the lead would pick up the gold and silver in the assay. Then you would pour off the slag, and the rest of the rock became slag. You would end up with a lead button, which you would beat into a cube. It was very malleable. Then you'd put these in a cupel and heat it up again, and some of the lead would vaporize off, but most of the lead would be absorbed in the cupel. Because the surface tension of silver and gold were higher, you'd end up with a little button of bullion, which was gold and silver. In the case of the Crown, it was mainly silver. Then you'd weigh this and dissolve it in nitric acid, and this would dissolve out the silver. Then you usually annealed the sample, and you got a little speck of gold, and you'd weigh this. You used an assay-ton of ore when you weighed; every milligram was the equivalent to an ounce of gold in the ore.

So you could predict what values were coming out of the mine at that time. Good description on the process.

Yes, I haven't done that for years. [laughter] I never did it at the Bureau of Mines. We had other guys that did the assaying and so forth, the analytical group.

So you worked in the assay office in the morning. What was your job in the afternoon then?

Well, almost anything that the mill foreman would have for me. Some days I might have to pick up mine samples first. Go up to the mine with a truck and pick them up and bring them back and put them in the dryer for the next day when you crushed them. Then the mill samples were all brought over by the mill crew, and they would put them in the oven, because the door was open all the time there, to dry. So when I'd leave the assay office, I'd do *many* things. I'd haul the garbage. There were, I think, four families living there and the cook house. Of course, at the cook house I'd get several cans full of garbage. [laughter] That was one of my jobs.

What four families lived there?

Well, the superintendent at that time was Mr. Harvey, who all the miners called "Hardway" Harvey. [laughter] He wanted to do everything the hard way. He wasn't even Portuguese. [laughter] Also there was the mine foreman, Carl Frandsen; and Slim Barry was the mill foreman, and he lived in a house, although he was single. Then the bookkeeper, Charlie Ross, and his wife had a house there.

So the managers lived in housing right there at the mine and the mill. And the workers, where did they live?

In bunkhouses. Actually, there were three. There was one like the staff house, and that's where the assayer, Harry Lee, lived. The boss for the Dodge Construction Company was Chic Thomas; he lived up there, too. And one other—there was a Heavy Phipps. Heavy—that was his nickname. He was the grizzly man. He broke the rocks on top of the grizzly, or blasted them.

They lived in that one. That was more like a staff house.

We had two more bunkhouses. One had ten or twelve miners who lived in it; and the other, the smaller one, was mainly the mill crew, because they sleep, you know, did shift work, and there might have been six of them living in that smaller bunkhouse.

We had a cookhouse or boardinghouse. The cook was Big Ed. [laughter] I don't know what his last name was, but he was a good cook, because he made pies and cake every day, baked. They did feed you real well. For breakfast you always had ham and eggs or bacon and eggs and hotcakes and toast and what have you. You could have cereal, too, if you wanted it. The cookhouse was also run by Dodge Construction Company.

So they had like a franchise on that, or they were paid on that?

Yes. They got paid so much to run it, and we only paid like a dollar a day for board, I think that was it, at thirty dollars a month.

A dollar a day for board. And then the bunkhouse was free?

Yes. We had a couple of showers in the bunkhouse. I lived in the bunkhouse in 1942, because my mother and father lived in a small trailer that wasn't quite big enough for me too.

So, I hauled garbage or samples. I worked a lot in the crusher, because the crusher was broke down. About every ten days we did the clean-up of the zinc precipitates. They would clean the precipitates out of the filter press, and then you'd prepare them to melt them down. You'd mix these with the fluxes again, soda ash and hematite, I believe, and some silica. Then this was thrown in the furnace, and you would recover the bullion. They had two big trunnion-fired furnaces, and you'd melt down, and then we'd get ap-

proximately two large bullion bars, each weighing about a hundred pounds. And this was done every week or ten days. You did a lot of general clean-up. A lot of ore would fall off the conveyor, so if there wasn't anything else for you to do, Slim would tell you to go out and shovel the ore back on the conveyor belts and the crusher, which was really dusty.

I mean, in those days, any horizontal surface, you could write your name on. I mean, this would drive an OSHA inspector *nuts* today, but that's how much dust there was. Oh, and then there was one dirty, rotten job that you would get about, oh, every two or three weeks: a lime truck would come in, and the lime came in hundred-pound paper sacks, and we'd have to unload these by hand. You'd put the sack on your shoulder and carry it into the warehouse. I weighed 120 pounds in them days, and the sack weighed a hundred! [laughter] So there would be three or four of us working on this. You'd take them into the warehouse right behind the mill and stack them up, so to speak. The bad part was that some of the sacks were ripped, and you'd get the lime on you. You know, it was hot, and you were sweating, and you'd get a lime burn, because it was so caustic, and this really hurts. So the second time I did this, I learned, and we put a rag under our hat and let it drape down over our shoulder. This saved your cheek from a burn, and it helped quite a bit, although it was still a rotten job. [laughter]

You talked about OSHA and the rules that they have today for safety, and you talked about lead fumes going off into the air when you were assaying.

Oh, yes. You had a fan on the furnace that put it outside, but there were no scrubbers of any collecting devices. [laughter] Just blow it out into the air and let it go. I think most assay offices were that way those days.

Nowadays, you've got a scrubber and some other types of air-cleaning operations, gas cleaning and whatever.

Then another thing was handling the cyanide. It came in three-hundred-pound stainless steel drums, and they could back up to the loading dock for this. We had to hand-truck these into the mill. This was a rather dirty job, too. [laughter] Then when they would put the cyanide into the mill circuit, it would be added near the ball mill. They had a lime feeder, also. They had a hoist so you could raise the can of cyanide, and then it had a mechanism for tipping it. You would dump this into the cyanide bin, feeder bin, and the cyanide dust would come up all around you, but nobody ever got poisoned or anything. [laughter] This was flake sodium cyanide from American Cyanamid Company.

But it didn't seem to cause any health problems that you could see.

No. I mean, today, oh, OSHA guys would have fits if they saw this type of operation. [laughter] I think that it's right the way they do it today, because you never know. A lot of the mines are delivered liquid cyanide. The plant there west of Winnemucca produces liquid at 30 percent, so that they can dilute this down to add to the mill circuit. Also, if they do work with dry cyanide, I'm sure that they have suction fans and everything that doesn't allow any of the dust to get out.

So you probably breathed a little lead in the air and some cyanide dust in your day, right?

Oh, yes. [laughter] Right.

You don't seem to have any ill effects from it that you can tell?

No. I also worked in three different mercury mines, and I never knew of anybody that had any problems with mercury poisoning either, but that doesn't mean what was done those days was right, I know.

The environmental rules have changed dramatically since 1942.

Oh, yes. Like I said, any horizontal surface you could walk up to where you were near the crusher, or even in the mill, you could write your name in the dust that was setting on it. So, you know, you don't get immediate reaction, but if somebody worked there for twenty years, they may have developed some lung problems—silicosis or whatever you want to call that.

Because there was plenty of silica in the ore.

Yes, in the ore. Of course, I think you can probably get silicosis from other ores, too, that don't have a high silicon content, but any dust that could settle in your lungs.

Did you know of any miners that had silicosis at that time?

Well, old Joe Makowski that ran the crusher coughed an awful lot, and that was a Polish Makowski. [laughter] Not Irish. In those days a lot of the miners talked about it, you know. Of course, rules at that time were that you drilled wet, and there wasn't any dry drilling. Most of the guys that worked there at that mine were in pretty good shape, although, later on when I worked at Cordero, I knew several of the miners there that had developed "con." One of them decided he wasn't going to work in the mine anymore, and he became a mill man so he could get away from the dust.

Of course, they all smoked cigarettes, in those days, too, [laughter] so, you know, how

much of it can you attribute to the dust and how much to the cigarettes?

So you worked there in 1942. The war was on. What was happening in terms of that?

Well, the assayer was Harry Lee. He was Chinese, raised in El Centro, California, and his parents had an Oriental restaurant there. We used to call them "chop-suey joints". [laughter] He was a graduate of University of California, Berkeley as a mining engineer. So Harry went into the service with a direct commission of captain as an interpreter. He did speak fluent Chinese, because his parents were directly from China. I never saw him again, but I heard from other people that he ended the war as a major and had been over in the China-Burma-India area.

Then the guy I replaced, Jerry, went into the Marine Corps. I can't think of Jerry's last name, but he had joined the Marine Corps, and he left. Oh, he broke me in for maybe a week, and then he was off to San Diego. Several other of the younger guys that had left, they were drafted. I remember one of the young miners that had been a CCC boy, who got his draft notice while he was there, and all I know is his name was Red. [laughter] Can't remember the rest.

In the Depression they had the CCC camps, and they had one at Golconda and another one at Lovelock and quite a few others. I think they had one up farther north by Oroville. These kids were mainly from the East, the large cities. They joined the CCC, Civilian Conservation Corps. When things loosened up, some of them stayed in Winnemucca, and this Red was one of them that stayed there and started working in the mines, and then he was drafted.

And were you up for the draft, too? Were you old enough?

No, I was only seventeen. I never registered for the draft. I joined the Air Force

Aviation Cadets when I was still seventeen. If you waited until you were eighteen, then you were subject to the draft, and you might end up in the army, navy, or Marines, depending on who needed so many people that day, but at seventeen you had a choice. I mean, a lot of my classmates joined the navy; a few of them joined the Marines, and there were about six of us from the high school in Oakland that went into the Aviation Cadets.

I graduated from high school in 1943. I was eighteen in May of 1943, and so, actually, I had enlisted before I graduated from high school, and then I was called that summer. I went into Aviation Cadets and went through all the training and eventually ended up as a navigator. I was still training on a B24 crew when the war ended. We were up at Gowen Field in Boise. We first trained at March Field, California, and then when we finished our training they had quite a few crews, so they sent us to extra training with the Seventh Air Force out of Boise.

Before you went back to finish high school, at one point in 1942, the War Board shut down all mining of precious metals. Were you there when that happened?

No, I went back to school in September. My father was working there, still. October 8, 1942, the War Production Board passed order L208, and because gold and silver mining was not essential to the war effort, they closed down, although some of the gold mines, like Gold Acres, kept going with old men. [laughter]

How could they do that?

Well, they didn't have any priority to buy any supplies and stuff, but I think they ran most of the war, because my father-in-law had worked up there in 1944 or so.

Interesting. I didn't know anything kept going in terms of the precious minerals.

Well, the Getchell kept going because they were producing arsenic somehow. They had the Cottrell that they would recover arsenic as a by-product, and then eventually they went to tungsten ores. They kept operating because they changed the mill to do a flotation of tungsten ores and recover tungsten concentrates. Tungsten, of course, was an essential metal for the war effort.

Were they also doing gold?

I think at the end they went strictly to treating tungsten ores. I think at the start they got to run the gold ores because they were recovering some arsenic. Really, I don't know any uses for the arsenic, except in poisonous gases—that mustard gas and some of the other gasses that the government did produce but never used. (Arsenic trioxide was a major insecticide before the development of DDT and other organic chemicals.) It was lucky. And the Germans didn't use them either.

So your dad was working there at the Crown when this order went through, but did it affect any of the jobs?

Oh, yes. Well, they all were laid off, but, of course, there was a shortage of miners in copper mines. They were even sending soldiers to work in the mines. I had a friend that spent his whole army career mining at Mountain City Copper in Northern Elko County. Rio Tinto was the name of the mine. I knew several others when I worked at the Riley Mine that spent their army career at the uranium mines in southwestern Colorado.

What did your dad do at that point?

He went down to Oakland, and he got a job, because he did know the retail clothing business. In fact, he used to work in the Christmas season at a couple of the stores

there in Oakland. Instead of going into the shipyard or something, he took a job and then eventually became “head of the basement” for Smith's in Oakland. In the basement they had work clothes, shoes, and certain other commodities, certain items of clothing, and he became the manager of the basement.

So he got out of mining. Did he keep your family claims going?

Oh, yes. During the war all you had to do was file; you didn't have to do any work. They suspended assessment work.

So, essentially, your whole family got out of mining then for awhile. When was your next connection to mining?

I guess when I started school. Let's see, I got out of the service in November of 1945, and I started the spring semester at University of Nevada. I decided to start in the School of Mines, and I didn't know whether I wanted to be a mining engineer or metallurgist at that time, or a geologist, but then I started going towards metallurgy, and then I graduated, of course, with a degree in metallurgical engineering in 1950. I worked these summers. In the summer of 1946 I worked at the Riley Mine, which is right near the Getchell, and it was a tungsten mine operated at that time by Union Carbide. I was a ball mill operator there in the summer.

Is that the first time you had worked the ball mill?

Yes, actually. I'd been around them before. The main thing in a ball mill, you take the gravity and make sure there's enough ore in the mill. Then you add so many pounds of balls every shift and so much lime and adjust the pH. So there's a few things that have to be done. You'd weigh the

amount of ore on the belt, and you knew how fast the belt was running, so you'd know how much ore you were putting into the mill. You might do that every couple of hours—take a reading on the belt. You'd take the pH of the pulp, and so you'd know if you needed to add more lime or adjust the pH. This was a tungsten operation, so with the flotation of tungsten, you do it on the alkaline side with a pH of around nine or ten.

And tell me a little bit about going to the School of Mines. What do you remember about your education at the University of Nevada—any specific professors or classes?

Yes, I liked things like chemistry, and I did pretty well in the mathematics. I liked some of the practical courses, too. I took surveying, and also assaying was, you might say, a practical course, because you learned something that you would use directly and not just theory.

Oh, I remember there were professors like Walter Palmer. He was the head of the metallurgy department. There were only three of us in metallurgy when I graduated, so they would only have three in some classes. In some we had four or maybe five, but they were very small, because there just weren't that many people. In geology, I think, they graduated about sixteen that year, and in mining maybe another sixteen, seventeen; and then just three in metallurgy. That was the three disciplines that you could get a degree in at that time. I think the class ahead of us, 1949, had five metallurgists, and that was a big one. Maybe in 1951, also, they had four or five, but we only had three.

I remember Bill Smythe and, of course, Claude Hammond. Claude taught the labs. He was very practical—enjoyed it. He was from Golconda. [laughter] He was raised on a ranch outside of Golconda. Then Jay Carpenter was the head, and these were all

practical mining people, because Jay and Bill Smythe had both worked at Tonopah. Maybe Jay had worked a couple of other places in mining.

So you appreciated their practical experience?

Yes. Sometimes we used to say, "We're going to a trade school." [laughter] Although we did have to take the usual: the physics and calculus; and physical chemistry was a tough one. And a few other courses: strength of materials and hydraulics. These things, you had to work at. The junior and senior courses in mining and metallurgy were far more interesting, I think.

You worked the first summer at the Riley Mine. Did you continue to work summers at mines?

Well, in 1947 I worked with my father some, and then I went home and did a lot of painting in the apartment house and stuff, so I didn't work too much in the mines in 1947. In 1948 I worked at the Sonoma Quicksilver Mine at Guerneville, California. That was mercury. I worked underground there.

Did you enjoy that or not?

Well, I didn't have any problem with it. I was a mucker, and then I did top landing. You take the cars off the hoist, or the cage, and run them out to the ore bin. I did some of that for several weeks. Then I worked underground as a miner's helper, whatever. Chuck tender.

Chuck tender? Is that title similar to a miner's helper?

Yes, because you're changing steel and so forth on the air drills, on the pneumatic

drills. We used conventional steel down there, so we didn't change the bits. Like some of the mines, you had the Timken bits that screwed on, and so when your bit got dull you just knocked it off, but down there we were still using conventional steel. [laughter] So you had to take a lot of steel underground with you, and you kept the blacksmith busy sharpening.

Then in the summer of 1949, did you also work in a mine that year?

Yes, I worked at the Getchell the summer of 1949. They were mainly doing construction work. They were revamping the mill, and when they were pouring concrete or had some big job, I usually worked as an electrician's helper. I ran a lot of conduit and pulled a lot of wires through a lot of conduit. [laughter] They were changing the mill to a different system that summer. They were going to use carbon cyanidation, and it didn't work out. Their gold recovery was very poor. This was a technique developed by Professor Chapman at the University of Arizona.

What had their mill been before that?

It was a conventional cyanide circuit, CCD they called it, and the oxide ore could be fed directly to the mill. The sulfide ore, which was high in arsenic, had to be roasted. There was a lot of arsenic oxide around, because the Cottrel that they had and facilities for recovering were not that good, and a lot of it escaped. They said that you couldn't keep a dog or cat, because the animals would get it on their feet, and they'd lick their feet, and then they'd die of arsenic poisoning. Also, the men that worked at the mine continually—all of them died young. Fred Wise was superintendent from this period. This was from the 1930s to 1947, 1948. They were still running the mill when we were doing a lot of the revamping. They were just run-

ning oxide ore. They weren't running any sulfide ore.

What is CCD?

That stands for counter current decantation. That's just how the pulp works and the solution moves, because their name comes from counter current. The pulp is moving in one direction, and the solution is moving in the other. But the roasters were the problem—they were putting out arsenic trioxide. They had to roast the sulfide ore, and it was high in arsenic, too. This arsenic got around. The man that was the roaster boss, he died young, Fred Wise, who was the superintendent—any of them that spent say, seven, eight years there. I know Carl Frandsen had arsenic poisoning, and he left. He was mine foreman over there at the Getchell, too. So he left, and luckily he got a hold of a doctor that could help him, and part of the treatment was taking a lot of vegetable juices. So he still had some problems at the Crown; he shook a little, but I think that he lived to a pretty ripe old age.

You said he shook a little. What were the symptoms of arsenic poisoning?

Well, he had a little shaking to him, and he was not a drinking man. Like I said, a lot of miners that were heavy drinkers would have the shakes, but he did not.

So when they were revamping the mill, was part of the reason to solve the arsenic problem? When they put in the carbon cyanidation?

Yes, well, that was part of it, and I think they were still going to use a fluo-solid roaster, a new type of roaster by Dorr Company, to roast the ore and get rid of the arsenic before it went into the cyanide circuit. See, cyanide doesn't work too well on

sulfide ores. It works real well on the oxide ores, which are the near-surface ores.

That's what I was going to ask you, if it was also the nature of the ore that was causing them to revamp this mill?

Yes. Well, they had mined most of the oxide ore. Nowadays, they're operating another company. Goldfield went in there in the 1960s and mined gold, too. Yes, it was Goldfield Consolidated Company.

What did it take to revamp this mill and change it over to the carbon cyanidation process?

I'm trying to think. I know that we put in some big thickeners, and they were going to have Trommel screens with the carbon and set it on top of some of the tanks to absorb the gold. Really, I shouldn't say too much, because I never saw the blueprints. [laughter] I was there for two or three months during the summer, probably two and a half months. I know they were putting in float cells, too.

Was that interesting to you how they were changing that?

Yes. There were quite a few of us from the university working there that summer. I never got really involved in what circuit they were going to use or anything. I should have. We poured a lot of concrete, and I ran a wheelbarrow a lot. [laughter]

So you graduated in 1950. I wanted to ask you, too, since you served during World War II, was the G.I. Bill of any help to you in going to college?

Oh, yes, definitely. From what I could make in the summer and the seventy-five dollars a month we got, I lived on it. I lived

in Lincoln Hall most of the time. We'd pay for a whole semester, and it was maybe a hundred dollars for the whole semester for room. When we first went there, the board at the "Gow House," which was the nickname for the boardinghouse or dining commons, was only like thirty dollars or maybe forty dollars a month. They kept raising it every year, it seemed like.

Would college have been possible for you without the G.I. Bill? Had you intended to go to college?

I had mixed emotions about it. But definitely when we got the G.I. Bill I decided to go. I think my grandmother then would have helped me through college. I'd probably have had to work some. But she did help me; she gave me twenty bucks a month, which, you know, added up for all the time I was in school. I didn't have a car till I was a junior. I had a car the last two years.

Did you buy that yourself?

Oh, yes, off a friend of my father's I bought an old 1937 Plymouth. It was a good car. [laughter]

So after you graduated, where did you go from there?

The first job I took was at Cerro de Pasco Copper Corporation in La Oroya, Peru. Three of us from the graduating class: Jim Hagar and Dewey Harwood, or "Bud" Harwood, and myself all went down to Cerro de Pasco—and one of the 1949 graduates had been there, Joel Morris, but he'd left about the time I got there. I never did see him.

Cerro de Pasco Copper Corporation was the name of the company, a copper corporation, but they also had a lead smelter, a zinc refinery, copper smelter, gold and silver refinery, the world's largest bismuth

refinery, and they also produced minor metals such as indium and thallium, antimony, cadmium—a whole slew.

I worked at the smelter at La Oroya, and this was a big complex. They handled ore from about nine different mines in central Peru, plus they also took custom ore from many other mines besides their own. Probably the lead, zinc, silver was the biggest thing at that time, more than the copper, although two of the mines, Morococha and Yarucocha, were mainly copper. I worked in the research department there. The research was connected with the smelter.

They were operating a pilot silver-refining cell, and I took care of that, under the supervision of one of the older metallurgists that had been there. Then I put quite a bit of time in the cadmium plant, which was also a pilot operation that was being run by the research department. Also, I did quite a bit of work on the zinc leaching or the zinc electrowinning plant. We were trying to control the leach solution pH and keep the iron from going into solution—or not too much iron going into solution. Then I had a coal dressing project, and the research director gave it to me to do all on my own. I should say the research director was also a graduate of the Mackay School of Mines, Ellis Gates. I think he graduated in 1934 or 1935, along in that period.

Was this a good first job right out of college?

Well, I didn't think so, so I only stayed a year till I saved up enough money to go home. [laughter] I went down there about 155 pounds, and in, say, ten months I was down to 125. I just didn't have the appetite, and I thought the food was *far* worse than in the army. [laughter] We ate in the staff house there, and I didn't care for the food. The Korean War had started, and things had

loosened up in the States, so I felt that I could get a good job back in the States.

So there weren't many jobs available in the States when you graduated?

In 1950, no, there weren't too many jobs, although I think that if a guy had looked around, he could find something. I was offered a job with the U.S. Steel down at Pittsburgh, California. I really wanted to go overseas and see what it was like, and Joe made it sound like it was a hell of a lot better than it was. [laughter] So anyway, then I came back, and that's when I went to work for Cordero in McDermitt, Nevada.



Let's go back and pick up a little bit of information about your time in 1949 at the Getchell Mine. You mentioned something to me about an attempt to revive that mine. Could you go into a little bit of detail about what you saw while you were there and what you learned?

I was just a laborer working at the Getchell in the summer of 1949, just before my senior year at Mackay School of Mines, but I'd heard that they were revamping the mill to do a process that Professor Chapman from the University of Arizona had worked out, and this would involve carbon in pulp cyanidation, where the carbon was placed in trommels and allowed to contact the cyanide solutions in the leach tanks and the agitators, so to speak, and also in the thickeners. So the mill did not start operating till about a year or so after I left. I heard from a friend, Roy Nojima, who was the assayer at the mine at Getchell at that time and also a 1949 graduate from the Mackay School of Mines, that the process was a complete flop, and that the heads would run twenty dol-

lars, and the tails would run twenty dollars, and Roy ought to know, because he was running the assays.

And what does that mean if the heads are running twenty and the tails are running twenty? What does that reveal about the process?

It means your recovery is zero. What you're putting in is the same as what you're taking out, or your tailings should run a couple of bucks, so you get a 90 percent recovery. Like I said, this is second-hand information from Roy, but I think he would be pretty accurate because he was running the assay office at that time.

So Roy Hardy, the consulting engineer, wanted to close the mine in 1951. In the meantime, the price of tungsten had gone up, and the government put a subsidy of sixty-three dollars a unit. So Royce Hardy, who was Roy Hardy's son, and Bill Newman, who was the mine superintendent, approached the senior Mr. Hardy with the idea of going back to treating scheelite and making tungsten concentrates in the mill. Well, Hardy wasn't too impressed, but he said, "Well, you young guys think you're so smart, I'll give you ninety days." I'm not exactly sure of the period, but he gave them a short period to get it going. [laughter] And they did. Royce and Bill did a very good job there. They revamped the mill and got enough tungsten ore to start. In the meantime, John Etchart from Winnemucca leased the Riley Mine from Union Carbide, and the Riley became the biggest source of tungsten ore for the Getchell mill. There was more Riley ore, I believe, treated than actual Getchell ore, and the Getchell also treated other custom ore from around the area.

So it was a process that was a new technology at that time with the fluo-solid roasters?

Yes, it was new to the Getchell, anyway. Then like I say, the process—where the carbon absorbed the gold from the cyanide solution and so forth—had been used other places, but I think Chapman must have made some changes there to develop it to work for the Getchell. It might have worked in the lab, but it didn't work very good in the mill.

Could you tell me a little bit about your experience at the Cordero Quicksilver Mine out of McDermitt?

Sure. I went to work there in May or June of 1951. I was hired by Eldon Gilbert, who was the general manager of the company—with offices in San Francisco at that time—to work on the recovery of antimony from the Quien Sabe at Hollister, California. The translation for *quien* is "Who knows?" [laughter]

Cordero had obtained this property a couple of years earlier, and at this time antimony had a good price on it; I think it was something like fifty-two cents a pound for the oxide. The air force was buying it at the time. They wanted to develop an electrolytic process rather than a smelting process to recover antimony from this ore, so that was my primary responsibility at Cordero when I went to work. Shortly after that I was the only so-called professional engineer on the job, and they didn't have anybody that could use a transit or do mine surveying, so I started doing mine surveying. Also, they had an assayer, a very capable guy, a local Basque there named Jess Jaca from McDermitt. I took over the assaying, too, and so I became involved in the day-to-day operations at the quicksilver or mercury recovery. The plant had a hundred-ton-a-day Herschhoff furnace, and so it was quite a simple operation. You just heated up the ore and separated the ore from the vapors and condensed the vapors in the condensing system to recover the mercury.

You said antimony was being used by the air force. Do you know what that was used for at that time?

It was for paint. It was a fireproof paint that the air force codes required for their aircraft at that time. Antimony has its traditional uses, too, as an alloy metal in batteries. I think the electrodes in battery lead are about 14 percent antimony. Then a printer's type used antimony, because antimony was the one metal that swelled on cooling. Every other metal expanded on heating, but antimony would expand on cooling, so this is what gave type the real sharp corners. There are some bearing-type alloys and other things that antimony also had a use for, but by the time we got the electrowinning process worked out for the antimony, the price had dropped, which is typical of mining. You put a lot of effort and money into a project, and then the next thing the price falls. So I went on. I used to do all the mine surveying and kept up the mine maps, and I would measure the contracts at the end of two weeks. We had a lot of miners that were contract mining. They contracted by the foot. It was drifting and raising, and it was all done by contract. This way, actually, it turned out cheaper for the company, and the miners would make more money because they'd work harder. [laughter]

Because they weren't on a payroll as employees; they were self-employed and contracting to the company?

Well, I think they were still employees, and they were on the health insurance and other things like that, but it was just that instead of getting a day's pay for their work, they would get paid for what they actually performed. This is easier to measure in a drift, in running drift or running a raise, because all you got to do is measure the footage, and they're paid so much a foot. So I mea-

sured at the end of every two weeks, which was the pay period.

Ed Hager was the field engineer for the company, and he was out looking for other mines. Quicksilver was one of the metals we always looked for, because the company had experience in this area. Also, tungsten, because the price of tungsten was good at this time. We looked at some chromite. I remember a fluorspar property out of Lovelock and a few others. Some of these that looked pretty good I did some recovery work on, so-called ore beneficiation and making fluorspar concentrates, scheelite concentrates, and this type of thing. We didn't have too much equipment there at Cordero. We had a Humphrey spiral, so we could do gravity concentration.

Can you explain what that equipment is?

Well, it's a spiral. It's about two feet in diameter when it's a spiral trough that comes down with ports in the center where the heavy metals all fall down, and the lighter material is washed to the outside. Most of the spirals are about five or six turns. Actually, when we built a mill using them, we only used three turns, because we could recover the scheelite. It was heavy enough from the gangue that you could make a good separation. Of course, this is run with water as the medium to move the ore, and the ore is crushed down to minus 20 mesh, roughly. They have been used in the recovery of rutile and zircon and beach sands. Climax, Colorado, used them for the recovery of huebnerite tungsten ores. Also, they were used at the Strawberry tungsten mine in California to scavenger scheelite from the tailings.

I think maybe I should mention some of the personnel at Cordero. Vern Haas was the superintendent. I worked for Vern. He was probably one of the most capable men I've ever met in my life. He was an excellent

mechanic, and he'd tackle any type of job and do it very well. Kenny Reed was the mine foreman at the time. When I did surveying and so forth, I would work with Kenny, and he'd tell me when he needed some work done, and we'd always work it in.

There were other people: Dick Metcalf was the bookkeeper; and the mine shifter was a very capable guy named Peterson. Of course, he was nicknamed Pete like all Petersons, but his real name was Holger, I believe, Holger Peterson. He did all of it, started mining coal at fifteen years old in Utah.

I mentioned Jess Jaca, and Jess was sort of the handyman there. He could assay, and Jess could run the CAT or do CAT skinning and whatever. Jess's father owned a small trucking company in McDermitt, so Jess was a good truck driver. One of his jobs was going to town every day to get the groceries out of the Quinn River Mercantile. The wives would bring a list up to the office of what they wanted at the grocery store in the morning, and Jess would leave about ten o'clock and go into town and get groceries, pick up the mail, and do other errands and then return, say, around one o'clock.

Now, did everybody live at the Cordero, at the mine?

No.

Did you live at the mine?

Yes, I was the only single staff man. I lived in the staff house, and I ate at the boardinghouse. We had a bunkhouse where probably about thirty miners or workers stayed, and then there was a camp down below. We had a schoolhouse at Cordero and one schoolteacher, I believe. They had six or seven houses down there for staff and some of the permanent miners. Then they had a trailer camp, and from ten to maybe

as many as fifteen people lived there in trailers with their families.

There wasn't anything around McDermitt in terms of stores or that kind of thing. Was the Cordero right in McDermitt?

It's eleven miles southwest of McDermitt. You could see right across the Quinn River Valley. You could see town.

I didn't mention that later on there was a larger operation there by Placer Dome, but this was strictly a surface mine, and at that time they couldn't furnace the ore. They put in a flotation mill and very sophisticated retorts to recover the mercury from the flotation concentrates, but when I worked there, it was a so-called deep mine. When I first came they were working down to six hundred feet, and then, eventually, they sunk a shaft down to seven hundred, and later on even went deeper than that.

This was an anomaly in Nevada in that quicksilver mines were rather shallow. They were a couple of hundred feet deep at the most. Cordero with the deep ore was the only operation like this in the Great Basin area. There was another large quicksilver mine on the Oregon side of the line. Cordero was just a few miles inside of Nevada, south of the Oregon line. The opalite mine was another twenty miles out to the west along the Oregon-Nevada line, and it was all done with pit mining. The Bretz Mine was also in this area, so it's probably true: the largest mercury producers in Nevada were up near McDermitt.

I know Cordero has produced more mercury than all the rest of the state of Nevada put together. It's probably the second or third largest producer in the United States. This was back in the days before mercury got the bad name. [laughter] A lot of the mercury that we produced went to different producers of caustic. Caustic is sodium hydroxide, which is used in soap, and there are quite a

few industrial uses for caustic. Caustic soda is another name for it.

In later years, they discovered the mercury in fish and looked to the source, like back in Michigan and in Japan and other areas. The source of mercury was the caustic plants, which were losing a certain amount of mercury. It was electrolytic process that used a mercury cathode to produce the caustic, and they would lose a small amount of mercury. So this got into the environment.

Was there any environmental concern at the time you were there in 1951? Was anybody paying any attention to the issue of mercury in the environment?

Yes, well, it was mainly watch your personal hygiene. Wash your hands before you eat. If you're going to smoke, and you're working underground, wash your hands before you light up a cigarette, because you may get some cinnabar on it, and you could get it into your lungs.

Cinnabar is the major mercury ore. It is mercury sulfide. It's a red ore, about like the color of your shirt there. So it's easy to spot, usually, and it's heavy, so that in the mine the shifter and Kenny Reed all carried egg pans with the handle cut off. With that they could pan the ore down, and they got real good. They can tell how good a grade it was by taking the fines and panning it. Well, within a pound or two you could tell whether it was eight or ten pounds. Say, you work with it long enough, and you get the assays every day, you learn to make a pretty good judgment of the grade. I was fair at it myself back in those days, and I didn't have the experience that they did.

Back to the environmental, it was mostly personal hygiene then—washing hands?

Yes. You heard the stories about losing your teeth, getting salivated, and mercury

poisoning and so forth, and then your hair would go, and your mind would go. I mean, the stories that The expression "mad as a hatter" comes from that. They used to treat the felt for making hats with mercury, and hatters would get mercury poisoning, and they'd become crazy, so to speak, and didn't have control. [laughter] Hence the expression, "mad as a hatter."

It's pretty severe when you start losing your teeth and so forth, although, as far as I know, there was only one guy while I was at the mine that had any problem. He claimed them, and the state industrial insurance fixed his teeth, or paid for his dental work, anyway. [laughter] We all wondered, because he didn't work in the mill. He was a mechanic that worked up at the power plant. At that time Cordero had three CAT generators, and they had to generate their own power. Years later, the Bonneville power came in to Cordero.

So this guy that you knew was working up there as a mechanic. So he wouldn't have been exposed that much to the cinnabar, is that correct?

We didn't think he was, but rather than the company making any arguments about it, they just sent him in. The state those days was pretty good about taking care of any industrial-related problem, or accident, so to speak. They made one bad design in the camp. They put the bunkhouse and the cookhouse on the windward side or on the east side of the mill, and the wind was prevailing out of the west. [laughter] We did have a stack. I used to assay the stack gases and always got fairly low contents. We had sprays and so forth and a lot of condensers. The stack temperature would run about 120 degrees, so there could be small amounts of mercury. Of course, day in and day out, it could have caused a problem, but nobody that lived in the bunkhouse ever seemed to have any problem. My house was a little bit

farther to the south, so I was sort of out of the main flow of gas or vapor from the stacks. The stack was only, maybe, fifty feet high, so it wasn't an exceptionally high exhaust stack.

People were aware of the damage that mercury could cause. Was there anything else that they were doing to protect people from mercury in the atmosphere at that time?

No, I can't think of anything else. I know we could dig around the mill. Well, I know one time I put in a drainage ditch for the spiral. [laughter] And this was right, oh, twenty feet from the condenser, so I found a lot of mercury in the ground—little beads of it. This was right adjoining to the pond where we recycled the cooling water.

So you knew it was getting out into the ground.

Well, yes. Over the years. The whole condenser system, the fan was at the end, so any leak would be inward. The condensers were on a negative pressure.

It would send it back in?

Yes, or air would go in rather than mercury come out, because you had your exhaust fan clear at the end of the condensers just before it went into the stack.

How has that changed over time since you worked there?

Well, I think EPA has outlawed all mercury furnace operations. There used to be two types. You had the rotary kiln, and then the Herschoff, which was a hearth roaster, where the ore worked back and forth. The rakes would rake it to the outside on one hearth, and then it would fall down into the next and go into the inside and fall down through a port on the inside. As the ore

worked, it would gradually be heated up. You see, you would fire near the bottom, not quite the bottom hearth, because you use those bottom two for cooling. I think this roaster had like ten hearths, so you fired on, like on the eighth hearth, and I used the bottom two for cooling.

So the ore gradually heated up, and then you took off your gases containing the mercury and so forth and other sulfur, because we got a lot of SO₂. You had other sulfide minerals besides cinnabar; you had pyrite and marcasite, but this would draw off from the sixth level hearth just above the burners and go through the condenser system.

The whole furnace was under a negative pressure, and we had pressure gauges at different spots. You controlled your temperatures, and I think we measured temperatures in about six or seven spots. They were all recorded on a continuous recorder in the dog house, which is the little office in the mill.

So that isn't even used anymore?

Yes, you can't even use a small retort. I never did get into the plant at Cordero that Placer Dome operated. I did visit the mine later, but they weren't letting anybody into the mill and into the retort room. So I imagine that was pretty well closed in, and there were no gases escaping, and it would have been heated in a closed-in retort.

Mercury was used in gold mining, is that correct?

Right. Yes, in the old amalgamation process that they used in the Washoe pan process at Virginia City and in some of the other early camps. Unionville, Aurora, Austin, and so forth used a great deal of mercury, and by the old figures they lost between one and two pounds of mercury for every ton of ore treated, because I did assay on a lot of old tailing piles, and I had got as high as four

pounds per ton in some of them. Some of them only a half a pound or so, but I'd say it would average around one and a half, two pounds. That was mercury that converted to artificial cinnabar. People think most of that mercury was lost as native mercury or amalgam, so to speak, but it would react with other sulfides such as zinc and antimony, arsenic sulfides, and replace the other metal, because mercury was lower in the electromotive series, and release the others, antimony or arsenic, zinc, into the solution, so to speak, and it would precipitate as an artificial sulfide.

The bureau did studies on this back in the 1920s, which were never very well publicized, that they ground various ores with mercury in amalgamation, and that they had considerable loss with certain sulfide minerals.

In the gold amalgamation, plate amalgamation, your losses were not near as great. You're usually working with highly siliceous ores and not too many other sulfide minerals, and so I think that there are probably losses of mercury. Like some of these over in California were down lower than a tenth of a pound per ton or even lower than that.

And by the time that you were working at the Cordero Quicksilver, what was that mercury being used for?

Our big shipments went to the caustic producers. I remember Penn Salt built a new plant, and we shipped two thousand bottles, as we called them, or flasks. Quicksilver was marketed in seventy-six-pound bottles. They're steel bottles, and they hold seventy-six pounds net of mercury. Back in those days, we tried to keep our production at just over three hundred flasks a month. Two thousand was about seven months production. That's what I believe Penn Salt's order was one time. In San Francisco there was a quicksilver broker there, and he would buy it and then sell it to the various users.

I see. So it was no longer being used in the gold industry.

Very little in this time. Some of the placer mines in Alaska may have used quicksilver. I know some of the sand and gravel producers that recovered by-product gold in California—those adjacent to the Sierra Nevadas on the west side—used mercury up into the 1970s, and then they had to quit. EPA and OSHA came around and said, "No more." But that was a minor use in the 1950s. Of course, you still use it in munitions. A small amount went into mercury fulminate. At that time the Korean War was going on, so they were probably producing quite a large amount of ammunitions at that time.

How long were you at the Cordero?

Well, let's see, half of 1951, all of 1952, all of 1953, all of 1954. So that's three and a half years, but the last year I spent in Idaho with them. Same company, but we did start a tungsten mine, which is a good story in itself.

Although our mining oral history project is not focused on tungsten, I'm curious to have you talk just a little bit about it, because you mentioned that tungsten was a major product during the 1950s when gold was not a major product.

Correct. I think the only gold mine that might have operated in the state of Nevada during that period was Gold Acres, and I don't know if this was a continuous operation or not, because wages had gone up and everything, but the price of gold stayed fixed at thirty-five dollars. So this had to make it tough for anybody trying to produce gold. [laughter]

The gold mines were closed down for World War II, and in talking to the people at Sil-

ver Peak, for example, their expectation was that once the war was over the mines would open up and things would go back to normal, but that never took place.

That's true. I always kept track of the Adelaide Crown, because it was right next to the property that my family had, and I know Mr. Hardy thought that he could start up after the war, but wages about doubled, and other materials all went up. When you had a marginal operation, a low-grade operation, there just wasn't any chance. Gold was fixed at thirty-five dollars.

So tungsten and copper and some of the other metals really took over during the 1950s in Nevada?

Oh, yes. Like I said, I think that with the exception of the two copper mines, Yerington and Ely, that tungsten was by far the biggest commodity mined in Nevada during the 1950s.

So you went to Idaho and started up a tungsten mine there for Cordero?

Yes. Ed Hager was the field engineer for the company, and Ed had been looking for properties for Cordero for three or four years. He'd been previously mine superintendent at Cordero itself. So he'd found this high-grade tungsten in Custer County, Idaho. It was up in the Challis National Forest, just over on the east side of the Sawtooths, where Sun Valley was immediately over the mountains on the west side. So it was in Wildhorse Canyon. Ed brought the original samples in to me about October 1953 to do some concentrating work on it. I crushed them up and ran them through the spiral and got very good recovery. A lot of this ore was as low as 1 percent. Some was down to .5 percent at one area, but at the area they called the steep climb it was very high-grade ore. It probably averaged 2 percent or better. So with

the spiral I could make a primary concentrate that ran from 18 to 25 percent and get a 90 percent recovery. Then I took the concentrates down to the Mackay School of Mines and used their table to see if we could grade them up to 60 percent. This was no problem; we produced a high-grade concentrate. The government had guaranteed to purchase a million units of tungsten, and so you knew they could predict that this was going to take place in 1956, about that period—summer of 1956. So the company made some quick decisions and decided to go ahead and put in a small gravity mill on Wildhorse Creek, just below the deposits. Haas decided that the way to build a camp was to prefab the buildings, and he started the carpenter and a couple of other people prefabbing buildings. He designed them, and I did the work on the mill flow sheet and designed a mill. We went around trying to find equipment, and we obtained a set of rolls, which would be our final grinder. We had a crusher crush the ore down to a couple of inches and then feed it into the rolls. We put a jig in the circuit and then recovered the coarse scheelite, and then three spirals for primary concentrator, and then we had a Wifley table to come out with a final product. Eventually, we put in a mag separator, because we had to upgrade the concentrate. The table cons were running around 50 percent. So we could upgrade them very easily to 60 by putting in a mag separator and so remove the magnetite and some of the garnet.

So we moved into Wildhorse Canyon. I think we hauled in the first prefab building, and had to have a CAT pull the truck in some through the snow, because this was in, as we called it, a snow gutter in Idaho—a steep canyon. It seemed that if it snowed anywhere in the country, it ended up in Wildhorse Canyon. [laughter]

Were prefab buildings normally used at that time for mills?

Not that I know of. Well, some of the larger ones, maybe the metal buildings, like the Butler, but we covered the mill with a large Quonset hut. We used it for the mill building. I mean, this is what's interesting now, when you look at how things go today—that Ed Hager brought that sample in to Cordero in October 1953, and we were turning our concentrate in the mill in July of 1954. Now, today you wouldn't even get an environmental permit in less than, probably, eight months to a year.

We designed a camp, a mill, and built them. We had some local guys come in and help with the concrete foundations, and we had to excavate the site for the mill. We built a machine shop, which we lost in the flood. It started raining in mid-June, and there was still a lot of snow in the high country, and we had a big flood. It washed out our bridge that we built, because the camp was on one side of the creek, and the mill was on the other, and the mine was on that side, also. So we had to start all over again. Had a couple of the workers got scared and quit. In spite of all this, we *still* got the mill in and operating and producing concentrates in July.

We learned, too, that you wanted to haul in all your equipment while the frost was still in the ground, because we had to cross a couple of meadows coming up Wildhorse Creek, and when the thaw came, there was no bottom in the meadows, so it was much easier to use a bulldozer and get rid of the snow on the road and drive in on the frozen ground, than it was after we got the mud problem. You'd bury a big truck up over the tires almost, and you had to pull it out with a CAT. [laughter]

We hired all local people. The fellow that found it was a sheep rancher just down below on the Big Lost River. He and his buddy worked for us. John Rosencrance had the ranch, and he worked part time for us. Stan Johnson worked for us all the time, but Stan was one of those guys that could do anything. He could skin CAT, and he also did

our cooking. [laughter] When we first started we had about six of us living in camp. The first building we put in was the office, and I think there were six of us living in the office and doing the cooking in there and everything. Then the next building came in was the bunkhouse, and the bunkhouse would handle maybe sixteen people. Then they built the cookhouse, and that had room for the cook and her husband. Her husband was a crusher operator once we got going. Tessie did the cooking for everybody. There were never more than twenty people there.

When you said the government was going to buy a million units of tungsten in 1956—was that from you, from this operation, or just in general?

No, all over the United States. In fact, I think a couple of foreign countries got in on that. I think the Mexican mines were selling to the U.S. government, too—a couple of them anyway.

But that was enough to make it worthwhile to start this operation?

Yes. A unit of tungsten trioxide is twenty pounds or 1 percent of a ton, so that's twenty pounds of WO_3 , which is the tungsten trioxide.

Then what happened when the government had completed its purchase of the million units?

The price of tungsten dropped from sixty-three to thirty dollars. The subsidy was off. I think every Nevada tungsten mine closed. The Pine Creek over in California, the big one that Union Carbide had, continued to operate. The operation in Idaho closed down. I left before it closed. I got tired of the snow, and I left December 31. I stayed through the year. [laughter]

I ended up going to work for Nevada Scheelite, and it was Ray Hendrickson hired me. He was the consultant engineer for Nevada Scheelite, which was a subsidiary of Kennametals, the large producer of tungsten carbide and other hard metals, alloys. The mine was near Rawhide. It was in Mineral County, just over the line from Churchill, but all the business was transacted in Fallon. The company had an office in Fallon, too.

They hired me as a field engineer or exploration engineer. Yes, because they had a mercury property in Lake County, Oregon, called Glass Buttes, which is out in the Oregon desert between Burns and Bend, about half way between. My job—they thought they had a real winner here—was to get the mine going, because the price of mercury was then around four hundred dollars a flask. They were running a raise through to the surface from an old adit that went under the deposit, and they weren't sure that there wasn't more than one ore shoot there, so where we started the raise, we were probably about a hundred feet to the surface. The fellow that found it, Bill Pringle, was an old Alaska miner that was a friend of Ray's. Ray had been at the University of Alaska back in the 1930s. We were running a raise from the drift level up to the surface, and the only miners he had were local farm boys, and it got too dangerous for them in a raise. They could run a drift all right.

Why was it too dangerous for them?

Well, you're raising up, and the ground was a breccia and not the most solid. It was an opalized breccia that was the host for the ore, and like I say, running a raise, you want to have somebody with a little experience. [laughter] So I called down to Cordero, and I got Dick Metcalf. I said, "The next two tramp miners that you let go, tell them I need them up here." So he sent Pete Peterson—this was not the one that was the shift foreman, another Pete Peterson—and Matt

Rooney up, and they finished the raise for me, but in the meantime I surveyed all the workings and assayed them all on five feet and set up a different assaying system. They were using a Whitton apparatus, and they were getting inflated numbers, because they were weighing the condensing of . . . Carbonaceous material from like roots and so forth would leave carbon on the silver foil that you weighed, and this absorbed the mercury. So I used the same system. We used it for assaying at Cordero—a wet system using thiocyanate to titrate the mercury solution. This showed much lower values of mercury in the ores.

So we did finish the raise, and I turned in my report to the company. I was up there, I guess, about two to three months. They had some ore stockpiled previously from the surface that had been mined. I guess they still didn't quite believe my assays. So we contracted with a small rotary furnace operation over on Crooked Creek. I think it was called the Platner Mine. We sent fifty tons of ore over there, and their recovery was less than one pound per ton. So they agreed with my assays. You know, they'd put a lot of effort into this—Ray Hendrickson and Mac McGuire, who was the West Coast director for mining operations for Kennametals, and they decided that we better close it down. We later tried for a DMEA (Defense Minerals Exploration Allowance) loan to drill the property, but the USGS (United States Geological Service) turned us down there. You could get the loans for exploration of certain mineral or metal commodities, but the DMEA turned us down later.

So you were just there a few months and kind of worked yourself out of a job, right?

I did. So anyway, Ray told me that they'd keep me on the payroll and to go out and find something else. So I started running around the country looking at different pros-

pects, mainly the metals, not gold and silver—although I did look at a couple—but other things that I thought the price was right, like copper. One of the major prospects that we looked at was the Dixie Apex Mine at St. George, Utah, just out of St. George. This mine became somewhat famous as a source of germanium and gallium, I believe, but we didn't even know about these things in those days. We resurveyed the whole mine. We brought in a diamond drill crew and did a lot of sampling. Pete Peterson, who had been the shifter at Cordero, had since gone to work for Nevada Scheelite, also, so he was down there with me and helping me survey the mine. We had to tear out some lagging to drop a plumb bob from one level to the next level, and that's when the blocking fell out behind the shaft timbers, and then we started looking at the shaft timber. This mine went fourteen hundred feet deep. You went in on a drift at about the five hundred-foot level; and that's where the hoist was, and so it was actually a winze, but the timber was all dry rotted in there. [laughter] You could take your prospect pick and drive it right up to the handle—it was that rotten. Of course, the mine was owned by a bunch of local Mormons at St. George. Snows and Cannons and Cox, I believe, were three of them. There were quite a few guys involved. They had a crew in there, too, sorting the gob in the old stopes and shipping it to the smelter, because this had been a high-grade copper mine and mainly mined up to World War I. So I just wondered how it had ever passed the mine inspector, but the mine inspectors, too, were local Mormons. [laughter] Nobody said anything about it, but I could just see today that they'd make you timber that whole shaft.

Well, that was fairly dangerous to even be in there, wasn't it?

Yes. The rock was all in limestone. It was a big replacement in a breccia zone in lime-

stone. This copper ore had very little gold in it, I believe, but maybe an ounce or two of silver. We had a time limit before we had to make another payment. We brought in a second diamond drill crew and tried to pick up the breccia zone and never did. Even working two shifts and drilling in three directions, we never did, and so the company decided to pull out.

I would think you'd be relieved, knowing about that dry rot.

Yes. Everybody knew. Well, scared you to go down. We had the drill crew down on the fourteen-hundred-foot level, too. But it's one of those things. You go down the shaft, and it works. [laughter]

That really brings up an issue about safety. Would that kind of thing be allowed today with the current safety regulations?

Oh, no. No way. Any mine inspector would make them retimber the whole shaft. Well, they may have got it on a temporary basis, because the mine wasn't operating, but they had, oh, maybe six men working in there besides the hoist operator. They had another five guys that were sorting ore and pulling it out of these little stopes, and that was the backfill. The ground itself was safe; it stood very well. The old-timers single jacked the original haulage in there, and when I surveyed it I shot the whole thing in one shot from a station right at the portal all the way back to where the hoist was, and it was seven hundred and some feet. It was that straight. It was just perfect. Square corners. They did a great job.

This was the first time we lived in town in a motel, and then we ate at a couple of the restaurants in town. This was the first time in my life I ever got tired of restaurant food. [laughter]

The boardinghouses were better?

Yes. Even though you could get a New York steak every night at a restaurant, you got tired of the food. Just wasn't that much variety, it seemed like.

I never heard you mention getting tired of boardinghouse food.

No, usually they fed pretty well. Both Nevada Scheelite and Cordero had excellent boardinghouses, and up at Idaho Tessie was a good cook. Sometimes we'd catch trout and let her cook them up. You're not supposed to do that, but if you want to eat them . . . [laughter] So yes, we used to go trout fishing up there after dinner at night. Go down to the river, and it was great fishing in that country. It was the only place I could go out and get a limit whenever I went fishing. [laughter]

So after you were at the Dixie Apex Mine, they shut that down then, too, is that correct?

Yes, the company dropped their option, despite the local geologist there. He was the one that really pushed the property and thought we should stay longer, but we couldn't see anything. I don't know if they ever developed that much more ore there. They found this gallium and germanium, but it was never a successful operation. A couple of years ago, when I was playing golf in St. George, I went out one afternoon just to see what was going on, and the plant was making cobalt oxide, bringing in the ore. It was run by Hecla. Hecla Mining had converted this mill that was supposed to recover germanium and gallium, but that was never a success either.

Is that the only mine that you worked in that you've gone back and looked at, or have you looked at some of the others?

Well, yes, I went up to Wildhorse fishing, but I never got quite up to the mine. We camped down on the Big Lost River in the Forest Service camp, because John Rosencrance had sold his ranch since, and so we couldn't stay there with him. We camped down there with this other couple, and we did really well fishing and had a good time. I've been back to Cordero, too, and I always thought I'd like to go up and see Glass Buttes, see what's happened there, but I've never been back up there.

Now, you mentioned somewhere along the way a square-set mine?

Yes. Cordero was a square-set mine. I should have mentioned about it. Mining was pretty expensive using the square-set system, but the ground at Cordero was what you'd call heavy and wasn't too stable, and they did have some open stopes up on the four and five level, but the six level was all timbered stopes. Now, also, they made the mistake of sinking the main shaft right near the ore, so you were mining, so to speak, real close to the shaft, and this was all in a volcanic tuft.

That doesn't usually happen, sinking the shaft near the ore body?

Well, you like to get back into either the footwall or the hanging wall and then run drifts over to your ore body. This way they had to leave a large shaft pillar, which they eventually pulled at Cordero. As they closed down the deep mine, they pulled it. They stoped it out. Also, the Nevada Scheelite was a square-set mine and pretty expensive, because nowadays I don't know, with the price of timber, if you could even think of doing it. [laughter] But those days timber was fairly cheap, and they bought lagging, and they had to backfill a lot of the stopes at Nevada

Scheelite, because the hanging wall was granite, and they made all their haulage drifts in the footwall side, in the limestone. Limestone held very well, but the granite was rotten, so to speak, and was fractured throughout. So you had to timber it all and keep the timbering up all the time. Then they'd backfill, and they'd put in lagging. I remember Jesse Wilson, who was a second-hand machinery dealer out here at Lockwood, bought up all the old railroad ties at Graeagle at the lumber camp. He hauled those old ties in, and we used them for blocking in the stopes. Instead of using ore as backfill he would just use those for cribbing in the stopes, and this would hold them.

Jesse was the one—changing the subject a little—that told me where they were getting these, and I said, “Well, where in the hell is Graeagle?”

He says, “Oh, it's an old lumber camp up on the Feather River.” He says, “You know, you ought to go up there and buy one of those company houses. You can get one for a thousand dollars.” [laughter]

I said, “What the heck would I want a house up there for? Now, I shoot myself every time I think of it. [laughter]

Oh, because it's a nice resort area, and you couldn't touch anything for a thousand dollars now.

Oh, yes. Graeagle is really developed.

The square-set timbering is probably most well known for being used at Virginia City.

It was developed at Virginia City and the first place they ever did, because mining such a large vein as the Comstock . . .

But it was an expensive way to go.

Yes. If you can do it, you leave your stopes open. You need to have good ground.

And even leaving a pillar would be less expensive than timbering, is that correct?

Oh, yes. Right. You could eventually pull your pillars as you move back out of a mine, when you figure you have everything mined out.

So altogether how long were you employed by Nevada Scheelite?

It would be roughly a year and a half. I left Nevada Scheelite in September of 1956. One of the other things we did, I talked them into drilling my father's copper property. They kept looking for a copper prospect, and Ray looked it over, and he said yes. He liked all the gossan up there. We had a lot of gossan on the surface, and we were hoping we could find another Mountain City.

What is gossan?

Iron oxide. It's usually of a unique form that you leave the little veins of quartz and silica with an iron oxide in between. It would have bugs in it, holes, so to speak. We drilled five holes up there in the winter of 1955 and 1956.

And where was your father's property?

South of Golconda. Right out by the Adelaide Crown, adjoining, actually, just to the north.

And what did they find?

Well, first hole we got a fair copper showing, like forty feet of 1 percent, and after that nothing. [laughter] We did pick up a silver manganese vein in one of the holes that ran about thirteen ounces in silver, but generally speaking it didn't look good enough. The property has been looked at by, oh, six or seven major mining companies, and the last,

I just got it back last month from Cambior. They're looking at it as a gold prospect, and they have developed eighty thousand ounces on the property, but they'd like to have a few hundred thousand and maybe a million ounces. We do have some good high-grade intercepts on the property.

But back then when you drilled you were looking at silver and copper?

Copper and nickel both, yes. We do have anomalous quantities of nickel on the property, but we never find any primary nickel minerals. Most of the nickel is associated with iron oxides. According to this last drilling, Cambior reports that there's serpentine on the property. This is sort of unique for Nevada. You don't find much serpentine in Nevada.

What is serpentine used for?

Well, serpentine is a very basic metamorphic rock that's come from the metamorphism of peridotites, a very basic type of rocks.

We've had a lot of companies come into the property over the years. It would read like a "Who's Who" of Nevada mining. I mean, it started back with Pete Galli, who brought in Union Carbide, and they were looking for lead silver on the east side of the property. I told you that they had shipped lead silver ore, and my father and I shipped some out of there, too, to the smelter in Salt Lake.

But to get back to Nevada Scheelite, we did some exploration work with five holes there. Then the next company was Carbide in the 1960s, say 1964 or 1965. Then we had Duval come in and do some geophysics and mapping. Then Cerro Corporation drilled a thousand-foot hole and did some shallow air-track drilling. This is holes about sixty feet deep. The thousand-foot hole didn't

show much. They did pick up the lead silver vein way down deep, but aside of that, not much. In the 1970s Greg Austin was in there, and there was Saga Corporation. He drilled three holes mainly on the big arsenic anomaly on the Gem claims. Then Phelps Dodge came in and did a lot of geophysics and soil sampling. They were looking for copper again. I guess Asarco was the next. They were interested in the lead silver, and they drilled six holes on the east side of the property. They had one that had a good intercept, but that was all.

After that, gold became more interesting. I guess Noranda was in there, and they drilled fourteen holes near the south side of the property. Then Exxon came in, and again, they're looking for gold mainly, and they drilled eight holes, and some of these five or six hundred feet deep. The only thing they hit was one intercept of lead silver, about forty feet of lead zinc ore, I should say, with some silver. I guess FMC was the next big company, Food Machinery Corporation. They found what they called the Knob Deposit, and this is the one that will have about eighty thousand ounces in it, and this is right on the extreme south end of the property near the Crown Mine. Then the last company to come in now has been Cambior. Cambior got a couple of good intercepts and one good trench where the gold content was about three-tenths of an ounce. In the one hole they had an intercept of one ounce gold, and this is two thousand or maybe twenty-five hundred feet farther north than the Knob deposit, so it indicates that there is gold down there. It was just because of the price of gold and the world situation that Cambior pulled out. They just didn't have the money to continue. So I'm running out of time—if they ever find a mine here. [laughter]

It sounds like there's a good indication that there is ore there, but the price of gold right

now is at a twenty-year low. That's not helpful to you, is it?

Yes. I have another company looking at it right now. They took all the data. I'm supposed to find out this week, I think.

How does that work? Do you contact them, or do they contact you?

Well, you contact them usually.

You contact them and see if they're interested. And then if they are interested, how would that work? Would you sell it to them, or would you lease it to them?

You'd make a lease option agreement, where you'd get royalties over production to usually an end price, you know, to pay it off at a certain amount.

So hopefully, that may happen at some point, right?

Yes. Wow. Hope the price of gold gets back up. [laughter] I guess everybody in the business sure does, yes.

So you were at Nevada Scheelite for about a year and a half, and then the price of tungsten just went in half. Did that have something to do with you changing jobs at that point?

Yes. My brother-in-law, Ed Hollingsworth, was working there at the time, too; he was a mine engineer. I spent quite a bit of time doing some work at the Nevada Scheelite Mine, too, but Ed left and went to work for the BLM, and I came in here and started school and then eventually went to work for Bureau of Mines part-time, which led to a full-time job. Let's see, I started part-time in February of 1957 and went full-time in June of 1957. Ed got fed up

with the BLM, even back in those days and went to law school. [laughter] He became a mining attorney, and he was active until he had a stroke here.



John you wanted to talk about the changes you saw over a period of time at the Cordero Mine.

In 1942 the crew at the Crown was a more permanent crew. In 1951 at Cordero, there was quite a change, and there were more tramp miners. When I worked as a kid in 1942, and the crew was permanent, there were a few changes. Like I said, a couple of the guys got drafted, and they left, but mainly it was a pretty steady work crew. When I got to Cordero in 1951, things had changed a lot. We had what we call the tramp miners—thirty to forty men that worked underground. They used to say they had three crews: one coming, one working, and one going. A lot of the tramp miners would just make one payday, and well, a lot of them were winos, and they went out and got drunk soon as they got a paycheck.

I wonder why that was changing between the 1940s and the 1950s.

Well, I don't know whether it's World War II or not. A lot of these miners though, had backgrounds in mining; they had worked in the old California gold camps, and some of them were from Missouri. But I think that maybe a lot of the steady guys got into something else. Of course, a lot of miners went into the shipyards and other defense work during World War II, and it was more the unstable ones that went back into mining. Although, some of them were very good miners—the so-called tramps—because they learned every system. [laughter] They worked in Butte; they worked in the Coeur

d'Alenes; they worked in some of the Nevada mines and in Arizona, so they got around quite a bit. They knew all different kinds of systems, and like I said, the Cordero was one of the few mines still using a square-set system.

You'd get to know a few of the guys, and the next time you went underground, they were all different. [laughter] It seemed like almost anybody that came out and rustled the mine got a job, but we were usually a man or two short, so that hardly any of them were turned down. The other thing I was going to contrast, we did have a good corps of local miners; some of these were Basque, like Alfonse Naveran—he was a very good miner. Tom Payne was another local guy. He was a character on his own. Tom was a rattlesnake man that used to live with rattlesnakes; he'd always have one or two in his trailer, so you wanted to be careful. [laughter] They were his pets. Say, I could go longer into this, but he was sort of like the man that Bob Laxalt wrote about in the *Man in the Wheat Fields* who made pets out of rattlesnakes.

Also, we had several Indians that were very good miners, and a couple of these worked contract and did all right—Grover Tom, I remember, and Donald Bell; and then there was another one, a big Indian that they had timbering most of the time, name of Ruben. I can't think of Ruben's last name, but he was a big, husky fellow. Of course, the mill crew was fairly permanent, much more permanent than the mine crew.

You've mentioned two ethnic groups: the Basques and the Native American Indians. Were you seeing any other ethnic groups represented at that time among the tramp miners or the local miners?

Well, there seemed to be quite a few Swedes, Norwegians among the tramps, and you had a few Irishmen. They're with Irish names, anyway. We used to kid about

McDermitt having two reservations: it was a Basque reservation in town, and about 90 percent of the people that lived in McDermitt were Basque; and then you had just south of town the Indian reservation.

Did you have any special stories about any of these people that you mentioned—Alfonse or Tom Payne or Grover Tom, any of the others? Any special memories?

Well, yes, I'd like to talk a little about Kent Maher. He was from Lovelock. Kent was a real character. He was born over at New Empire by Carson City and got through about the eighth grade in school, never did go to high school, but Kent was a self-educated man. He read all of Shakespeare and things like that. He'd pull Shakespeare quotations out quite often. Also, he was a great kidder and joker, and he was the blacksmith at the mine there. He did mine awhile, but they made him the blacksmith. He was a real handy guy. In fact, during the war he was running the Rochester operation. They had a bunch of old miners up there that were too old to go in the service, and they tried to keep the Rochester operation going for a promoter named Oster.

The Rochester is just out of Lovelock. That's one of the old major mining camps. At one time we had another miner that was there for quite awhile, Fred Fisher. Cordero being a small mine, we didn't have underground facilities like some of the other mines. If a miner got the urge in the morning to go to the john, he'd go up to the surface. So Fred Fisher was very timely. He'd hit the mine, and at about 8:30 every morning he had to come back up and go. So Kent took a pair of miner boots and put them in the stall and closed the door in the change room there, so when Fred came up he saw the miner's boots, and so he waited. There was no guy inside—the boots didn't move or nothing. [laughter] So in the meantime, there were about six of us along with Kent

peeking around the corner watching Fred. He'd pace up and down and, *oh*, he'd yell at the guy in there and say, "Come on, hurry up, I got to go." [laughter] So finally, he got so mad he walked over and pushed the door open, and there was this pair of miner's boots. [laughter] Yes.

Was there a lot of that going on—people pulling practical jokes on each other?

Well, we did some. Kent pulled one on Dick Metcalf and I. I told you Dick and I were good buddies. Kent about convinced us that there were freshwater abalone at Rye Patch, and we didn't own a boat or anything, but we did know people that had one in Winnemucca. So we made the arrangements to go down after these freshwater abalone. Of course, about the time that we were ready to go, Kent told us there wasn't any such thing. [laughter] But he really convinced us at first.

His biggest trick—and it got him into some trouble with the law—was when he was working at Rochester. He had come into town and asked for this other fellow. I don't know his name. Call him Jack. "Where in the hell is that son of a bitch, Jack? I'm looking for *him*."

And then Jack would come into town and hit different bars, and they made sure that they never would run across one another. "Where's that son of a bitch, Kent? I'm going to get him."

So after they established that they were really mad at one another, Kent was standing at the end of the bar in one of the bars there in Lovelock, maybe Felix's. This was on Fourth of July, and the bar was loaded, and Jack came walking in, and they both drew pistols—with flags, of course! [laughter] God, you never saw people move so fast. [laughter] That Kent said it was great, but he and Jack were both arrested, and they had to pay like a fifty-dollar fine for disturbing the peace. He said you never thought

those old guys could move so fast. They jumped over the bar and went any direction they could.

Sounds like there was a lot of good times and a lot of good teasing.

Oh, yes. We got back at Kent a couple of times, too, after that abalone thing. The other thing is why I liked McDermitt in the fall. It's that we'd go deer hunting and then, later on, pheasant hunting. It seems like everybody in town would go deer hunting, and not everybody went pheasant hunting. I liked to hunt the pheasants better because it wasn't near as much work as deer hunting. [laughter] But a lot of the people in Winnemucca didn't know that there was a large number of pheasants there in McDermitt between the Lucky Seven Ranch and the Indian fields, so the locals had pretty much their own way in pheasant hunting, during pheasant season. Of course, then you had chukars and other things around, and sage hen.

And this was one of the places where you mentioned that the state mine inspector came up.

Yes, Merv Gallagher was the inspector most of the time. Of course, Merv would come out and take a cursory look around the plant, and he always timed it to get there at lunchtime. [laughter] So he'd have lunch, and sometimes he never went underground. We didn't have too many accidents up there. We had a few. We had one man killed while I was up there. He was a truck driver by the name of Clayton Johnson, and he married a local gal, Claudia Reeves, and had gone to work in the mine for the first time. They put him with Eddie Marcuerq—Marcuerquiaga really—and he thought Eddie was a young kid and didn't know much, and so after they blasted, Eddie told him to stay back until they cleared everything down and

so forth. Clayton went right in, and a big slab fell on him, and he was dead by the time they brought him out. Course, they rushed him to town, because a death in the mine meant you close the mine, and just dead on arrival at the Winnemucca hospital . . . that's where he was pronounced dead. But, yes, we had several other accidents. I can't remember Antone's last name, but he was another Basque miner from Jordan Valley, Oregon, and he had a big slab fall on him, so he had his head scratched up and cut, and I remember Jess Jaca and I took him into Winnemucca. [laughter] He wanted a drink in the worst way, but when we went through McDermitt, I didn't want to give him any, because he had the scratch on his head, or which turned out to be a scratch. I didn't know how bad it was, but he was hurting pretty bad all the way in. The only thing we could give him was some aspirin. So we got him in, and I asked Doc Ruckle, about it. He says, "Hell, you should have given him a shot of whiskey. That little scratch on his head wouldn't have made any difference." [laughter] So anyway, that was a seventy-five-mile ride, and Antone recovered all right, and then, instead of going back in the mine, he went to work in the mill running the furnace.

If there was a death in the mine, it closed the mine down? Explain that to me.

I think under the law that if somebody was killed in the mine, the mine inspector had to come and look at the spot where he was killed, so the mine was closed down until that could happen.

But if the person was taken out and pronounced dead somewhere else, that didn't have to happen?

Well, I think that's sort of the way it was. Although, you know, the accident that caused it was underground. I think Johnson

was killed on his first week there. He didn't work at the mine very long.

Were you on duty when those two things happened?

Yes, I was there. They both happened during day shift. We had several other minor accidents. Antone broke his leg in a couple of places, and I think maybe a few ribs, and he was laid up for quite awhile, but most of the other accidents, you went in, and a lot of the people drove themselves in. Like I got caustic in my eye. I drove myself in. I had one good eye. [laughter] A few other things like that, but minor accidents.

You always had to go for medical help to Winnemucca?

Yes, there was nothing in McDermitt.

I wanted to go back and pick up one other piece, too. We talked about the Getchell Mine off and on. You loaned me an article about the history of the Getchell Mine, but you had heard, sort of through hearsay, some differing information about some things that were going on there. Could you just give me that story?

Well, I think you're referring to when they revamped the mill in the late 1940s or 1949, and then they started the gold operation using the process that Professor Chapman at the University of Arizona had worked out. Of course, they did use the process that Jack Zadra worked out at the Bureau of Mines, but this was just to strip the carbon. After the carbon became loaded with gold, the Zadra process was developed where you're using a caustic cyanide leach to recover the gold by first leaching it from the carbon and then using electrolysis to deposit it on steel wool. Then the steel wool was melted down, and you recovered your gold bullion. Chapman's process dealt with

the extraction of the gold from the ore using carbon in pulp cyanidation, so to speak.

Of course, the ore was first roasted, and this is where, someplace along the line, it did not work very well. It could have been in the roasting step. It's not doing the job, or maybe they over-roasted and possibly encapsulated some of the gold by fusing the ore particles. Roy Nojima was the assayer at the mine at the time, and Roy told me that if the heads ran twenty dollars, the tails almost ran twenty dollars. They weren't getting hardly anything out of it.

This occurred in 1951, and that's when, according to Roy Nojima, Roy Hardy came up and told his son, Royce, and Bill Newman to close the mine down. That was it. They couldn't go on recovering only a small amount of gold. So that's when Newman and Royce said, "Why don't we go back to tungsten like we did during World War II? There's plenty of tungsten ores around here, and the government has put on this subsidy." [During the Korean War, 1950 to 1953, the U.S. government agreed to purchase three million STU of WO_3 for \$63.00 per STU. The program was administered by GSA.] I said the earlier that it was a *million* units. It was three million STUs or short-ton units of tungsten trioxide, or WO_3 as we referred to it. The senior Hardy was not too impressed, so he said, "Well, you guys are smart young guys. You go ahead. I'll give you ninety days to do it." To revamp the mill, which meant putting in flotation cells and a few other changes. The grinding circuit would have been the same. They had to put in facilities to acid leach the concentrates to upgrade it. They did it—they had the thing going in ninety days, and so the Getchell went on to be quite successful treating scheelite there from 1951 until about 1957. I also mention that a good part of the ore came from the Riley Mine when it was milled on a fee basis with Union Carbide, but only about a third of it. I looked at the annual reports up at the Historical Society the other day, and it was

approximately a third of the tungsten ore came from the Riley Mine. They were making money those days according to their annual reports, so they did well.

That wasn't a time that you were working there, but you were in touch with some people who did work there, so you kind of knew what was going on?

Yes, right. Well, like I say, Roy Nojima was the assayer all during this time, and then Roy was assayer for Goldfield Consolidated when they took the mill over, too. I went over there and spent three days with Roy—it would have been in 1953—so I could learn how to assay for tungsten before we started the operation up in Idaho at the Wildhorse Canyon.

So Roy filled you in. Now, we have already talked about your working in various places, but about 1956 the tungsten subsidy was gone, mining jobs were scarce, and you weren't getting any takers on working your father's claims. Is that the sequence that led you into changing and going from the private sector to the public?

Well, my original plan was to go back to school and get a teacher's certificate, so I started school here in September of 1956 at the university, and I needed eighteen hours of class work, mainly education courses, to get a secondary teacher's certificate. I completed this in the two semesters, did the practice teaching in chemistry at Reno High School, and then taught algebra over at Sparks High School for six weeks. In the meantime, I was running short of money, so I got a part-time job at the U.S. Bureau of Mines in February of 1957. I worked in rare earth chemistry. The extraction of yttrium and other rare earth elements from a euxenite residue was my major project at that time, and I was the low man. There were a couple of other professionals working on

it. Van Shaw was the project leader, and Don Bauer. Well, anyway, about the time I started interviewing for teaching jobs there were many openings. Science teachers, as today, were in short, short supply, so I had no problems. I got a good offer from Auburn, California, and another one from Fallon, and another one from Winnemucca.

In the meantime, Tom Graham was the research director at Reno, and he came up and talked to me and told me that if I wanted to stay he would give me a raise there, which would give me more money than teaching, although I wouldn't have my summers off. So I took his offer, and I stayed with the bureau, and, all told, I was there twenty-eight years, which gave me something like thirty-one years because of my service time.

So you started out in the rare earth chemistry. It was a research project?

Oh, yes. The rare earths were very popular at the time, and the Reno station had just been enlarged. The new, large station was dedicated in 1954. So it was only a couple of years before a lot of the labs were unoccupied. They weren't even finished when I went to work in 1957; they were just vacant rooms. And they kept adding people.

Why was this popular?

Well, they were looking for new uses, was one of the things. They had one group producing high, pure, rare earth metals such as cerium, lanthanum, neodymium, and some of the others.

Reno had started out as the Rare and Precious Metals Station, so they did mainly work on gold and silver, and in the early days they did extraction on radium. I think it was the first place in the United States that radium had ever been extracted. So I guess it was a natural for the rare earths to fall into this category, and Reno got essentially almost all the work on development of rare

earth metals and alloys. Also at this time the Mountain Pass deposit of bastnasite had been found, and Moly Corp was the company that operated the mines down near Las Vegas, just right off Highway 15. You can see the operation there from the highway. But that was another reason that they found a vast deposit. Before this time the rare earths were like the name implies; they were considered a rarity, and you didn't find many ores with them. Monazite, of course, was a by-product of dredging and a few other things. Then in Idaho they had this mineral, euxenite, at Bear Valley near Stanley, Idaho, and the euxenite was a columbium tantalum rare earth complex mineral. It also had some uranium, thorium, and then the heavy end of the rare earth minerals, which starts with yttrium and goes on to dysprosium and erbium and [laughter] Oh, I can't remember all of them now, but there's about six in the heavy end of the series, and they're rarer than the light group, which is cerium, lanthanum, and Of course, cerium had been used for mischmetal, which is a mixture of rare earth and light rare earth and was used as lighter flints in cigarette lighters. Over the years they developed the rare earth phosphors for TV, which give you the colors when they're excited by electrical current. You get these different colors that give you your picture on TV.

I don't know much more about it than that. [laughter] I mean, you get too technical on that. I worked only a short time in this group, and then Jack Zadra came up with a technique for recovering tungsten by fuse salt electrolysis—I should say molten salt electrolysis—and so they transferred me down there to work with Jack, and that was a good move. I enjoyed working with Jack Zadra, and I think the two of us accomplished quite a bit.

This process that we came up with was not really new, but we developed it so you could apply it to ores, rather than just tungsten oxide as a feed material. We were using

molten phosphate and borate electrolytes, and this was done around a thousand degrees centigrade, so we could dissolve the scheelite in there and also deposit high-grade, well, 99.9 percent tungsten metal. So then we applied this to molybdenum, also. One of the major discoveries—we got a patent for it—was separating molybdenum from tungsten. Since molybdenum is lower in the electromotive series, we could deposit it first, prior to the tungsten.

And that was a new process, to separate the two. Does the patent reside with you or with the U.S. Bureau of Mines?

Domestic rights went to the government. Foreign rights, if you wanted to pay for obtaining foreign patents, could go to the inventors. I did this subsequently on two patents down the line, but not on this.

When I was involved with the recovery of tungsten carbide by gas sparging, we made a deal with a group in southern California, a limited partnership, and they paid for filing this patent in several foreign countries. There was also one on the borate smelting of ilmenite which was filed in Japan and a couple of others by some interested people. I didn't spend my money, but I got a percentage of the foreign rights if we were to be successful in making a commercial process out of it.

Explain to me then the role of the U.S. Bureau of Mines. Was it entirely research at this point?

No, they had groups that did the commodity analysis, and they kept track, and this was based in Washington, D.C. The commodity analysts—one person would have one commodity, or sometimes they would have two, or maybe three at the most, but they covered everything that was mined, including stone, sand, and gravel, fertilizer materials, as well as the metals. Probably, it

took a couple people to cover copper and maybe lead and zinc—the major metals—and also iron and steel. This group, instead of being disbanded when they closed down the Bureau of Mines a few years ago, was transferred to the U.S.G.S. [United States Geological Survey] So I think industry still wanted somebody to keep track of the quantities of material and the prices. When they would do their annual reports, they would also report any significant research and so forth in the area, any other news that affected that certain commodity.

In the early days we had the Health and Safety in the bureau, and this was transferred out and became MSHA [Mine Safety and Health Administration], and now it's with the Department of Labor.

And then what happened to the research? Where did that go when the whole thing was disbanded?

Most of it was closed down. The Albany Station—some of their work was transferred to the Department of Energy; and I believe that the Pittsburgh Station also became part of Energy or one other government agency, because I understand that the Pittsburgh Station is still going. They used to do a lot of health and safety research at Pittsburgh, because it's mainly connected with coal mining and that.

So you were there working primarily in the research department through your whole twenty-eight years?

Yes, I was a research metallurgist.

And at any point were you involved with gold, silver, copper?

Well, my main work with gold was when we did the project on the recovery of by-product heavy minerals from sand and gravel operations. Of course, gold was one of the

metals, or materials, that they recovered from sand and gravel operations in California and some along the west side of the Mother Lode, you know, in the American River, Yuba River. On these the plants recovered significant quantities of gold, clear down to the Kaweah River near Visalia. One plant off the San Gabriels there in San Gabriel Valley also recovered gold. But yes, I think that was my only significant work with gold, and then through this I became a placer mining expert in the Bureau of Mines, because any questions about placer mining, henceforth, were directed to me in Reno. I mean, the Washington people had questions.

You were located in Reno, but this work that you were doing was primarily in California for that by-product recovery from the sand?

California, Oregon, Washington, and Nevada—four states. We had plans to expand it, but we didn't find significant other heavy minerals that the government was interested in, and we thought that we might come up with some columbium, tantalum, more chrome. We found a little chromite and rutile titanium. We found lots of ilmenite, but the country has lots of ilmenite. These were the ones that we were hoping to find, and so it was terminated before we got into any of the other Western states, although we did do a little work on some Alaska materials.

You would have been with the Bureau of Mines at the same time that the Carlin Trend was being discovered and things were changing significantly in the gold mining industry. What was your awareness of that? You became the placer mining expert. Was there any connection between what you were doing with the placer mining and what was happening with the Carlin Trend?

Not really. This work was mainly done by a very good friend of mine, Harold Heinen. Harold had previous work with Jack Zadra on the development of the Zadra process, and so he was, say, the principal investigator and helped develop the heap leaching process, and the agglomeration heap leaching I think was one of Harold's major developments, because he was the first, I think, to start the agglomeration heap leaching. I only talked to him from time to time and had a good idea what he was doing, because we'd worked together on the tungsten and molybdenum electrolysis years ago.

So as it started to unfold, were either you or Harold aware of the significance of what was happening over in the Carlin area?

Oh, yes. You know, we read technical journals and newspaper reports, and then Harold had a lot of contacts. We saw the finds at Jarrett Canyon and there out of Winnemucca, Chimney Creek, and all of these things as developments came along. Most of these companies like Newmont did most all their own research and development, and they were working closely with the bureau. I think Harold worked with some of the mining companies.

Do you know if he worked with Cortez?

I think they did some work with the Cortez ores and some of the smaller ones like Buckhorn. They did quite a bit of work on Buckhorn ore, because they brought in a whole bunch of it and put it on the parking lot, maybe fifty tons of it or so for a stockpile, and they used this ore to do some large heap leaching and for research. That was the only place you could put it. [laughter] And the same thing later on, when they brought in about fifty ton of Stillwater ore. We were working the platinum project on the

Stillwaters, because they ran a small pilot plant on the flotation of the Stillwater ore.

Sounds like this was an interesting time all the way around, both in what you were working on and what some of your coworkers were involved in, in terms of research and development.

Yes, I think it was. It was exciting, because mining was picking up in the state, where, back in the 1950s and early 1960s, things were pretty dead. You had the two copper mines, as I said before, and the magnetite at Gabbs, and that was about it. I don't think there was anything going on at Pioche at the time.

So really the hope for mining in Nevada was in the research and development.

Well, I think the finding of the Carlin deposit and the micron gold . . . although I think Getchell, they just didn't call it. I'm sure the Getchell was a similar type deposit, but it wasn't recognized as such. The finding at Carlin and the successful operation there, even at thirty-five dollar gold . . . Then I think the big thing, the price of gold escalated, too, when 1980 came along, and it had started going up into the two-hundred-dollar range in the 1970s.

So it was really more those two things: the location of the Carlin Trend and the change in the price of gold that made the difference.

Oh, yes, right, and the development of technology. Then heap leaching came along, and you could treat very low-grade ores, like down to .02 per ton. I think some of them were even lower than that. But say .02 was a fairly common cut-off. That would have been at about eight-dollar rock.

And yes, the heap leaching then. The big operation there at Round Mountain, also. Another one that I know the Bureau did a lot of work on was the Candelaria, which was more a silver operation than gold.

Tell me about that. I don't have any information on Candelaria. What was happening and what was the bureau's involvement in that silver operation?

Well, like I say, it was silver, and became a large heap leach operation. I guess Hecla was the first company that got going there, and I'm not too sure, because I was not involved again, although I did go down there years later. I think that they tried to use the electro-oxidation process. That wasn't Heinen; that was Bernie Scheiner that was more involved in that. This was a process where you broke down the carbon and other mineral constituents that may have hindered the gold leaching, cyanide leaching, by treating it in situ in a salt solution and using electrolysis to generate sodium hypochloride, which would attack the carbon and other species in the ore in order to render it leachable.

In the silver it was to break down different mineral constituents. Silver is much more complex than gold. The gold is mainly just the native element, whereas silver can form compounds with many other elements such as arsenic, antimony, sulfur, and other metals.

What role was the U.S. Bureau of Mines playing in this time period where mining began to change from the post-war dollars to the Carlin Trend find?

Well, as a supporting role. You know, we did what we called "political metallurgy." [laughter] We wrote our own projects, and they would tell us what the major problem

was, and then we would come up with a program to solve the problem. After Sputnik everything was geared to recovering high purity metals for possible aerospace applications. Tungsten had the highest melting point of any metal, but it also was as heavy as gold, so you were dealing with a very heavy, dense material. So if you could come up with ways to produce this in a lighter mass and still get the high temperature properties of the metal Titanium became very big, although most of the titanium research was done at Boulder City and some at Albany.

It's high temperature. It's a refractory metal. The bureau was involved in development of mineral materials to solve some of the problems. There was the development of the super alloys: tungsten, cobalt alloys, and so forth, that they used in jet engines.

We haven't talked about space travel starting during this time. The launching of Sputnik was a very big deal.

It was good for the government scientists, I'll tell you. [laughter] Yes, we all got raised to the top of the grade right away. It loosened up the grade structure, you might say, and made it easier to get a raise. Yes, that happened in 1959, so I'd only been with the bureau a couple of years at that time. It was thought that there might be possible uses there, too, for the rare earth metals. Everybody was looking at them, and a lot of the private industry work was geared in this direction. Batelle Institute and others were working on development of new alloys and metals to solve some of the problems here in rocketry. Oh, in your rocket was very high temperature in a very corrosive atmosphere and extreme oxidation for a few minutes there when the rocket goes off. The bureau worked on different alloys for the rocket nozzles, also, but as I said, it was political and involved our balance of trade in the 1980s. That's part of the recovery of by-prod-

uct heavy minerals from sand and gravel operations that we got that program through at that time, because we had imported 100 percent of our rutile, like 90 percent of our zircon, 100 percent of our chromite. I think tantalum was 100 percent. For a lot of these metals we didn't have any domestic sources. To help solve the overall problem of negative balance of trade, we were trying to develop sources here in this country and use our own material. Tin is another metal where we've depended on foreign sources for years.

You called it "Political metallurgy." You really had to have a sense of the government's priorities at that time in order to do these research projects, because you're talking about the era when there was the cold war and the race for space, and then you're talking about the era of balance of trade in the 1980s.

And we still have that problem. Yes.

Were there any other priorities in the government that were impacting your research projects or directing them?

Directing them, I guess, is the word. Yes. Well, I left in 1985.

So it would have been the 1950s, 1960s, 1970s that you saw, and the early 1980s. And were those the main two priorities, the race for space and the balance of trade?

Yes, mainly during my period, that I can think of. I'm sure there were others. You know, some senators had local things. I think the Duluth Gabro in Minnesota was pushed by senators there, and they wanted to see some development and were looking for nickel and possibly some cobalt in the Gabro, and copper, of course, although, we do have plenty. The mining state senators and probably the companies in some of the other states had some pet projects, and these

things were brought to the attention of the head bureaucrats in the Bureau of Mines.

Bob Horton will tell you more about this, because he was head of the bureau during the Reagan years, or director, whatever. I retired in 1985. Bob was still there when I left, and I guess he stayed for another couple of years. I worked under him. I'd see him a couple of times a year. [laughter] That was about it. I think I remember when Doc Henry was deputy director. Doctor Henry had been *our* research director, and then he went to Washington as deputy director. He said the trouble with this job is, "I got to spend 80 percent of my time with people *above* me, and I can't do a good job directing people below me with only about 20 percent of my time." I think that's what happens when you get into those high jobs.

So you didn't see your directors very much?

Well, the local director, the research director, Tom Graham, you saw most every day, and we might have meetings once a month or something. Tom Graham died in 1966, I believe, and then Doctor Henry took over. That's Tom Henry. Then the next director was Frank Block. I think Henry went back to Washington about 1971. So then Block took over from 1971 to about 1980. He was there quite a few years. Frank was a good boss. Then the last that I worked for was Art Colombo, and Art turned out to be an excellent director. I think he was a little bit hesitant at first, being new, but after that he ran the place. He didn't depend on Washington for everything. I was a supervisor in metallurgy, so I worked closely with the research director.

And did you have people under you then?

I would have as many as five or six professionals and then another three or four technicians. I never had less than two projects all the time I was there. Sometimes

I had as many as four projects. So you'd have to have one professional at least on each project, and then some technicians working with them. The way that we were organized then, we had an analytical group for technical services, which did all our assaying, and we had very sophisticated analysis for the times, so we had excellent facilities to do research.

That was all here in Reno?

Right. They had a full-time mineralogist.

Now, when you're telling me about the U.S. Bureau of Mines closing down, that closed about 1995?

Yes, I retired like in 1985, and I think Bob stayed through the Reagan years, which would have been up to 1988 or so. I went to the final party. It was December 1995.

Tell me, for you personally, what was the change like to go from the private sector to the government sector? Was it a big change for you at first?

Yes. The bureau was a little different. I'd worked for small mining companies, so there I was in a large organization. I had been on the staff and a boss in the small company, like at Cordero and Nevada Scheelite. But at the bureau I started in at the bottom of the ladder, as far as the professionals went. I started in as the GS-7, which was pretty low, but I did start in part-time. In the private sector we didn't go much for reports, you know, unless something major happened, or when you finished a project. Like when I closed down Glass Buttes, I wrote a report on it and did the maps and everything, brought them up to date, but here we were writing reports every week, it seemed like, and then nobody ever read them, anyway.

Then we did a monthly report. Well, first we went into so much detail. Then—this

happened when I was still with Zadra, so it had to be early 1960s—Washington said that our monthly reports were fifty-six inches high from all the stations. No one person could read them. [laughter] So then they wanted summary reports. They cut down on all the detail, you know, how you did something. At first they had wanted detailed information: you put the bolt on, and then you got a wrench, and you tightened the bolt, and then you went over and you picked up another bolt and a nut. [laughter] This type of thing. Too much detail. So, yes, I thought that was great—fifty-six inches high from eight or nine stations at that time doing metallurgical research. So after that, we'd just write more a summary of the major accomplishments and this type of thing. You always had a work plan and how your work conformed to the work plan. It did get better in that respect from when I was first there, although a lot of people thought we had to write too much as it was, because sometimes some months went by, and you just didn't accomplish much in research—nothing you wanted to talk about—and then the next month you might have two or three things where you made some good progress. So that's the way it went.

But you had to report even in the months when you didn't have anything?

Yes, sometimes if you had a couple of good things in one month, you might save one for the next month. I guess, actually, I'm saying monthlies. I think we wrote quarterlies. We wrote monthlies for local reporting, and then from our monthlies we edited it into a quarterly. So that's what went back to Washington was the quarterly report.

One of the reports that I did, say, in the mid-1980s or so, had a diagram that we drew, a flow sheet, and we had put in the report. Well, when they put this together in Reno, it was left out. It was Figure 1. I didn't discover this myself for a year or two, so when

I had my retirement party, I told everybody that, "I know these reports are going into the national archives, and they're very important, but in all this time"—it was like eight years—"nobody has ever read this report and found out that Figure 1 was missing. So I'd like to turn it over here to the government." [laughter]

But that's, you know . . . whether we wrote them back East, I don't know.

On the one hand you felt like you were doing some really significant research and coming up with some patented processes, but on the other hand, your reports were not being read?

Yes, well, like I say, this was the quarterly report that went internally to the Bureau of Mines, but I know from going back to the Washington office several times, everyone of those guys would have stacks maybe a foot or a foot and a half high of paper on their desk that they were supposed to read. So I guess every once in awhile they'd just sign off on everything and forget it and not look at it. I'm sure that's how that got by. But it was so important, and yet nobody ever read it. [laughter]

A couple of other things were happening during your time with the U.S. Bureau of Mines. The environmental regulations were changing, and women were becoming more involved in mining.

Yes, this is one of the political things I didn't mention—the environmental movement. In fact, I had projects that were to solve some of the environmental problems. One of them was with the treatment of ilmenite, an iron-titanium mineral, to produce titanium dioxide pigment. Most of the plants that treated ilmenite by the acid process were on the East Coast and Gulf Coast. They used sulfuric acid to digest the ilmenite, recover titanium dioxide, and leave behind an

iron-acid sludge. This acid sludge was put in barges and hauled out in the ocean and dumped. EPA said, "No more." So we came up with a new process. That's where the borate smelting of ilmenite came about, because you recycled the borate that you used as a flux, and you'd eliminate the acid waste. The new technique involved smelting ilmenite at 1200 degrees centigrade to produce pig iron and a borate-titanate slag.

So then there wasn't anything that had to be dumped, is that correct?

No. Right, you'd recycle the borax, because this was a rather high-priced material, and the iron was recovered as a commercial-grade product, but this was a technique that some people thought was worth patenting in Japan and a couple of other countries, because the Japanese had a big problem there, too. They were destroying some of their fisheries by dumping the acid waste.

Well, I came up with two processes there. Another one was using soda ash to smelt with sodium carbonate and recovering sodium titanate, which then could be used as a feed material for the preparation of titanium dioxide pigment. About 90 percent of the titanium at that time ended up as titanium dioxide, which was used as pigments in paint and paper filler and other uses like this, rather than as titanium metal. This was the big use.

The projects at the end after I left were a good share of them, maybe 75 percent of them, environmentally oriented. I know of some of the work on cyanidation and so forth, all cleaning up cyanide. I know Sandy McGill, who had worked for me earlier, because I did some consulting in this area with a company that would come up with different processes to kill the cyanide, so to speak, oxidize it, and either that or recycle it or whatever. They wanted to keep the cyanide out of the environment, which is the thing to do. I know the Salt Lake Station got in-

volved big in cleaning the SO₂ from stack gases. I think that they built pilot units that were used in some of the copper smelters, but the process I don't think quite worked out. It wasn't all that great. It was one of those things that worked a lot better in the lab. A lot of these come up that when you scale it up, you get other problems. It generates its own problems sometimes.

It might work well in the lab when you're working on it, but when you do it large-scale for a mining operation, it creates other problems. So you were seeing a real trend. By the time you left, the project had moved to be 75 percent in the environmental area. That's a big change.

Oh, yes. Well, you know, most all the old processes did kick off some effluents into the air or as liquids into the rivers and creeks of the country. We realized that you can't go on forever doing these things, which was good.

Then you asked me about women. The two people right under me, Betty Baglin and Andrea Raditz, were both women that were very capable, too, and that was, of course, at the bureau. The bureau probably, under government and Equal Opportunity and so forth, started hiring women probably earlier than some of the mining companies, although I remember going through the mill at Climax in 1977, and quite a few of the flotation operators and other workers in the mill were women at that time. That was the first time I really noticed women working in the mills. Also, they said that they had some women underground running the motors and so forth for hauling the ore. Then I noticed that at the School of Mines, you started seeing a lot of these women chem engineers, because the chemical engineering department became part of the School of Mines. There were a lot of women students there and also some taking mining and metallurgy. This probably happened after the late 1970s

or 1980s. I know we had quite a few women working at the Bureau of Mines when they were students, and a few of them continued on with the bureau. But the last director of the Reno Station was Andrea Raditz. I should say Clark. Her name was Raditz most of the time she worked there, but she married, and her married name is Clark. She's married to the adjutant general of the Nevada National Guard.

So when you started with the Bureau of Mines in 1957, were there any women working there?

Yes. There were a couple, but they were in analytical. I think there were two women in the spectrographic lab, and they were doing spectrographic analysis. I don't think there were any in research directly. I can't think of any at that time. Then I remember Judy Eisle came and started working in liquid solvent extraction, but she stayed there for quite a few years and she was head of the gold mining group after Harold Heinen left, doing research. She was very capable, too.

So there were one or two around when you first started, but you saw more women in the late 1970s. That's where you started to see it?

Yes, late 1970s, 1980s. Well, Betty and Andy both came to work in the 1960s. By the time I left, both Sandy McGill and Joan Snider had worked for me. There were quite a few women throughout the building. I'd say a good third of the research people were women by the time I left.

You went through a lot of changes during that time in the mining industry and in the bureau itself.

Well, I think the major changes that I've seen are the sizes of the operations and the

advances in technology, too, that go along with this. Heap leaching would be one of the big advances. It was very cost effective. Getting more into the carbon and pulp type cyanidation. They built tailing piles ponds—back in the early days you just put in a dam, and then as the tailings built up you sent a bulldozer down there and dozed some more material onto the dam, and you never made any thoughts about what was soaking into the ground or getting into the water table. Nowadays, it's really something with liners and all. I think that what little I saw of the new quicksilver operation at Cordero was certainly different, much different than the way we handled things, and with using flotation and modern retorts, so that you wouldn't have any gases escaping at all, which was completely different than operating a Herschhoff or a rotary furnace. Then I think that the size of these operations is a factor. When they built the Getchell mill it was six hundred tons, and within a few years it was enlarged to a thousand, and outside of the copper operations at Ely it was the biggest mining operation in the state. So nowadays some of these mines are handling much greater amounts. I believe Round Mountain was handling thirty-five thousand tons a day, and that was ore putting on the heaps, just not counting the amount of waste that they had to move. When you go up to Carlin, and you look at the heaps, they're *tremendous*. I mean, I don't know how many million tons in some of them. Say, they stand maybe a hundred feet high and four or five hundred feet long—so a lot of tonnage there. Then the haulage of the ore—you can haul a hundred and fifty tons in one load now, whereas, back in the days before World War II, a ten-ton truck was a big one, and most of the trucks that Dodge Construction hauled ore in—six to eight tons was all they held. [laughter]

Then drilling. I mean, the pits you ran with a wagon drill, which would drill twenty-foot holes. Today, you use rotary drills, and

you drill a lot bigger hole, and maybe you operate on a forty-foot bench instead of twenty, and you can blast, I don't know, several hundred thousand tons at a time. Then the large crushers—they use them today without a grizzly. Back in the Getchell you had to have a grizzly. You couldn't feed anything, say, over a foot into the crushers. You had to break the rock with a hammer or a doublejack or use dynamite to fracture the rock so it would go through the grizzly. Nowadays, they just dump directly in.

Then I think another thing is treating the sulfide ores with autoclaves. This is certainly a major development. The first mine to use this was the McLaughlin Mine over in Lake County, California. Now, I know the Getchell has autoclaves, and I think most of them do—Newmont and Barrick and Jarrett Canyon. So they're used throughout the state here in treating the sulfide ore and carbonaceous gold ore. This is prior to leaching. This treatment is so that you can get good extraction.

Can you describe briefly what that process is—the autoclave?

Well, the autoclave is an instrument that they used in the tungsten mine at Golconda. Nevada Mass built it back in World War II, in the 1940s. An autoclave is a vessel that you can pressurize and heat so you have high temperature and high pressure. If you heat this up to, say, three or four hundred degrees, and it's closed, you're going to get a couple of hundred pounds pressure. Between the combination of heat and pressure you'll break down the minerals. In the autoclave process, if you have pyrite, you produce sulfuric acid, which helps destroy some of the other species that cause problems related to the cyanidation.

So that's basically what an autoclave is. I'm not sure how high they run them. We had processes at the bureau where we used autoclaves, for aluminum extraction from

clay and other materials, and also I did some work with tungsten extraction using autoclave.

Of course, I think the biggest change is just the size of the operations. The Getchell had a tin shed for an office, which probably was thirty feet wide and maybe forty, fifty feet long, and that was it. Nowadays, you go into a modern masonry, stone building or frame structure that will be the office, and I'm talking about the office on site, like Barrick has out there at Carlin.

Can you give any examples of technology that started here in Nevada and then spread into the mining world elsewhere?

Yes, I would say the heap leaching of gold. I know that heap leaching of copper had been going on for years, but gold, I believe, was first done by Newmont on the Carlin Trend, and then also the heap leach agglomeration was here in Nevada and spread out. The use of the autoclave started in California, but was brought into Nevada shortly afterwards.

Can I just ask a question about heap leach? Now, I've had some conflicting information that maybe the first time it was used was actually at the Cortez Mine rather than by Newmont. Do you know exactly who started using that heap leach process?

Yes, it could have been, because the two of them were contemporary at the time. I would say this was probably late 1970s.

And they're both over there within a very short distance of each other.

Yes, the heap leaching may have started at the Cortez. I'm not sure, because I know early on it was going on at Newmont.

But that would be an example of technology transfer, where it started here in Nevada and then went elsewhere.

Yes, I think that the heap leaching started right here in Nevada. Of course, at that time, outside of the big underground mine in South Dakota, most of the gold mining was being done in Nevada. I know California had several mines down in Imperial County—the Mesquite Mine and a couple of others. Glamis was down in that area. But now, as I say, the major gold mining was done. Of course, Nevada is still producing 60 percent of the gold in the country.

Yes. Fairly significant. You mentioned earlier that you became the placer mining expert while you were with the Bureau of Mines. Was most of that still over in California, or was there some placer-type mining going on over here in Nevada?

It was mainly in Alaska and California. The dredge had started over at Marysville, and so we made several trips over there, and we worked for the recovery of by-product minerals from the dredge concentrates after they took the gold out, and then we'd have a concentrate high in magnetite, ilmenite, and zircon and possibly a couple other trace minerals. Can't think of any other placer except the sand and gravel. For awhile the largest gold mine in California in the mid-1970s, was Tiechert Sand and Gravel operation in Sacramento, right in the city limits of Sacramento.

Because the gold was the by-product there, which was the same thing that you were talking about.

Yes, right. It was a sand and gravel operation. I think that they ran something like nine hundred yards an hour through their plant, and, of course, they only ran eight hours a day, but still, that's a lot of material, and they were in the Ancestral American River channel, so they had thermal, and they started recovering a platinum by-product,

too. That came about by our work, that we were the first to recover platinum from these tailings.

The placer mining, did it ever achieve the scale that the mining in Nevada did with the heap leach process?

Oh, no. No, the big days for the placer mining were previous to World War II. Say, the Depression era was when they had the Natomis dredge up by Folsom on the American River, and then the Yuba dredge out of Marysville there. They had a lot of dredges. They had dredges down on the Merced River, on the Tuolumne River at different spots. Jenny Lind, I think, is on the Calaveras River. And up at Oroville on the Feather River there was a lot of them, but once the environmental movement started, there wasn't going to be any placer dredging. The thing is that they could get by with it at Marysville, because the company owned a large parcel, hundreds of acres of land in there, and the dredge pond was separate from the river. The area is full of tailings from the dredging. The coarse material from the dredge operations is stacked up all over the area, so that you wouldn't have any objections, so to speak. It's out of sight. [laughter] If you drive through there on the highway you can just barely see the top of the dredge over there.

Alaska is still operating dredges. They have quite a few placer mining operations going in Alaska, but I've been to placer mining conferences in Fairbanks, Alaska, and they're not very happy with the new government regulations. They figure that sort of curtails some of their operations.

The environmental regulations are putting some limits on them?

Well, yes. The BLM and so forth. So that hurt them. Miners threatened to shoot any

of the government guys that came on their property—right there in the open in the meeting.

Feelings are running pretty high.

Well, they were. This was in 1983 that I was up there. I gave a paper at the conference.

Those are still some pretty rugged individuals in Alaska—the old sourdough type.

Yes, when we did the tour of Alaska we went on one of the dredges. It's the tourist dredge now; it's not operating, but downriver there were still dredges operating out of Fairbanks. Nevada had dredging operations, too. They had dredge at Dayton, probably the best known, and then another dredging operation at Copper Canyon, out of Battle Mountain, and also a lot of placer mining at Spring Valley, which is just over the hill from Rochester. It's on the east side of the Humboldt range. And then Osceola, almost on the Utah border—it's over near Great Basin National Park now. All these were significant placer camps in Nevada, but they haven't operated except for small operations. At Spring Valley there's been people in there, but they don't stay very long, and then there's always been a shortage of water, too, in Nevada.

Yes. For dredging that would make a big difference.

Well, most spots.

So we were talking about changes over time, and the main one is really the size of mining operations, and maybe government regulation fits in there, too.

Right. You have to cover your tailing ponds, and you can't have over 50 ppm (parts

per million) cyanide at an open pond. Oh, I don't know, there's a whole bible of regulations out now to affect placer miners, or all miners, I think. Yes.

Yes, miners and mines in general. I've heard other people say that the regulating process takes months just to get a mine started. Sometimes years.

This one in the state of Washington, the Crown Jewel, which Battle Mountain Gold is the principal company involved in, has taken now seven or eight years. Every time they get the go-ahead—their permits passed or okayed—the Sierra Club or some other group comes up with more objections and throws them back into court. So I don't know if they'll ever get operating. It's too bad because this would have been a good mine. It's in eastern Washington, but the extreme environmentalists come out of the Puget Sound area, Seattle, where the high population is. Probably, the local people want the mine to get going, because it creates good paying jobs. Same thing here in Nevada—probably the few people that do oppose mining live in the metropolitan areas and never get out there very much, anyway.

When you were traveling around in more recent years, did you hear objections to the mining out in those areas?

No.

People are mostly for the jobs, is that correct?

Yes, most of the local people want to see these things happen.

Right, and we're seeing a big problem right now in terms of the price of gold going down and lots of people being laid off from jobs.

You can tell this really hurts those smaller mining towns.

True. They say things aren't moving. A lot of mobile homes and stuff are for sale in Winnemucca today.

I'll bet that there are. We kind of ended up with you retiring in 1985, and you've kept your hand in mining?

Well, yes, I did some work afterwards for Arrowhead Industrial Water. Word got around the state that Arrowhead was trying to get companies interested in using reverse osmosis as a way of reclamation of water, or solutions, I should say, of cyanide solutions. The technique was applied back in the Black Hills at the Golden Reward, because they had such a heavy rainfall in winter that their ponds were running over, and they were forced to use reverse osmosis to clean up the solution. Well, you'd concentrate, say, 90 percent of the cyanide and other heavy mineral constituents into 5 percent of the solution, and then rest of the solution could be discharged. I think they had to add a small amount of sodium hypochloride or some other chemical, so then it could be discharged. One of the problems there was that downstream was Deadwood and other population centers. But the process was not cheap enough. It was about fifty cents a ton of solution, and I think this was just too high for most of the mining companies. I think reclamation is another big change. When you leave a property nowadays you have to almost restore it back to original conditions and remove all traces of toxic elements, such as cyanide and heavy metals, such as arsenic, mercury, so forth.

And it has to look as though mining never took place there.

Yes, the aesthetics. I know that they did this at Relief Canyon out of Lovelock. It's

about twenty-five miles out of Lovelock. Oh, it's near Rochester, too. They spent a lot of money cleaning up the operation, but my thoughts on this, you know, it's only a couple percent of the people that live in Nevada that have ever been to Relief Canyon. It's in a pretty dry desert area, anyway, and you hardly even notice the dumps against the hill; everything blends in. I would like to see them *take* the money that the mining company puts up to do reclamation, and turn it into a fund. With it they could purchase land like at Tahoe or some desirable spot for state parks, rather than to spend six or seven million out at Relief Canyon. [laughter]

Where hardly anybody is going to be using it.

Yes. I've talked to politicians about this, but it doesn't seem to go any farther. Well, maybe most of the super-environmentalists, the so-called Greenies, want the thing restored for the use of the jack rabbits and the rattlesnakes or whatever that live out there. [laughter]

But that doesn't seem to you to be the best use of the money?

No, I think that they should just put the money, like I say, in a fund and have a committee to look it over and say, "Well, it's not necessary to do this."

So that not every mine would have to go through reclamation. Right now is it the rule that every mine has to have a reclamation plan?

Oh, yes. Right. They have to have a bond, and a lot of the companies put up so much money out of every ounce of gold produced for the reclamation. In Colorado they claim that the Cornucopia walked off and left that operation at Summitville. The state of Colorado operated a clean-up operation at the

mine site for many months. The state sued the previous operator to recover the cost of the clean-up. Cornucopia won the suit.

And so they don't have to do the reclamation?

Well, they didn't do it, really. They weren't contaminating things that bad, because, I guess, you got such a dilution factor from the river down below. I shouldn't talk too much about it because I was never involved. Just what I've learned from the newspapers and so forth.

But for the most part, companies are required to do their reclamation. There's no other way right now.

Oh, yes. Right. They have to.

And who have you talked to when you had this idea about using those funds elsewhere? You've talked to some of our state politicians?

Yes. I've talked to our local assemblyperson.

And you're not getting much response?

No.

It's an interesting idea, just in light of all the activity that's going on now to try to reverse some of the damage to Lake Tahoe, but it seems like there might somewhere be some interest in it if you can speak to the right person at the right time. I don't know.

Yes, better use for the money, because Tahoe is a very desirable area. Like I say, Relief Canyon, who knows where it is? [laughter] There will be other places in the state, too, and of course, in some of them that have drainage problems into the

Humboldt River and so forth, probably you'd have to do the reclamation.

Right, to protect the water sources. You worked for Arrowhead Industrial Water. Did you have any other jobs related to mining after your retirement?

Yes. One of the last projects I had at the bureau was producing tungsten carbide by a gas sparging technique, where we sparged what we call the halide-tungstate phase. This we react with methane gas to produce tungsten carbide. I should say the first step of the process was developed back in the 1960s. It was a patent that I was the principal inventor on where we could treat scheelite or wolframite with sodium chloride and sodium silicate and heat this up to around a thousand degrees centigrade, and it would form into two distinct phases. The tungsten would form sodium-tungstate and would be absorbed in the sodium chloride in the salt phase. This could be decanted off, and you left behind a silicate phase with the iron, manganese, calcium, and the other gangue minerals. Most all of the tungsten and very little of any other metals went into the tungstate-halide phase. So then you would take this molten phase and stick in a pipe, so to speak, a probe, and bubble methane natural gas through at 1,100 degrees centigrade, bubble it through the reactor, holding the molten phase, and you'd form tungsten carbide.

Over 50 percent of all tungsten mined is converted to carbide. Carbide is by far the biggest use, and it's the hard metal compound that's used for machine tools, rock bits, like what they use for drilling in the mines. Most drill bits are tungsten carbide bits and very hard and very durable.

There are harder substances, but they're not as tough, so to speak, as tungsten carbide. So this looked like a good process. I had an old friend that's a promoter from

southern California, and he had a limited partnership with a bunch of doctors and dentists and a couple of other realtors or something, that took on the patent, and we were paid fifty thousand dollars for it. My co-inventors were Andrea Clark and Betty Baglin. They paid also to have this patented in about fourteen foreign countries, all the ones that produce tungsten carbide, the major industrial countries of the world, like, Germany, England, France, Italy, and then Japan, and Australia, New Zealand, I think. Anyway, they hired a patent attorney in San Francisco to do it, and then they went to Canada and Vancouver, and we formed a company, International Carbide of Canada. So we made a deal. I should say "we." I wasn't much in on the negotiations here, but anyway, they were able to make a deal with Canada Tungsten, which was a branch of American Metals Climax, at that time. AMEX was the name of it. We used Canada Tungsten's facilities in North Vancouver and built a pilot plant to produce tungsten carbide in a company, and designed reactor out of inconel, which is a high temperature alloy of nickel, chrome, cobalt. We produced fifteen hundred pounds of tungsten carbide. We did have some problems with the environment, because of the salt cloud, even though we had a scrubber on the end of the line. We had a problem there of keeping the salt fume out of the air. So that's what I was saying about when you scale up. We never noticed this in the lab, because we were doing it on a small scale in a hood, but the Greater Vancouver Environmental District got on our butts and told us, "As long as it's visible, you can't operate."

Well, we said, "Hell, we're next to the ocean. The ocean is full of salt, so we're putting a little salt into the air." [laughter]

We had to go into a more sophisticated system, the same system they used to vacuum up asbestos. We had one of the outfits that was doing asbestos cleanup hook

onto the end of our line, and they got out the salt fume. So we were able to continue again, but we had other problems. In our exhaust system the excess methane would break down and form carbon. This would build up in the exhaust pipe and stop the operation, and we'd have to stop and clean that out. Although we made a satisfactory quality tungsten carbide, it was still not good enough to take on the more sophisticated uses like machine tools and stuff. It could be used for hard facing on parts. Also, it could be used for making drill bits and some uses like that of the valuation, but we ran out of money about that time. We went through the original company and ran out of money. Then another company took it over a year later, and we made a second attempt. Then we had Cominco Engineering, which is a big company, work with us on it, and they monitored the whole operation, although they didn't offer too much help in the way of solving some of our problems.

So your project in Canada eventually ran out of money, and you closed that operation down then.

Yes, that was in 1988. One of the principals of the company died, and so things sort of fell apart after that. They had enough material, and they had it evaluated over at UBC, University of British Columbia, but it sort of died. About this time, too, the price of tungsten had really fallen down.

Now, you've kept your hand in the mining world in what way? It seems like you never really completely retired.

Yes, I've still got mining claims out of Golconda, and we've had these tied up by several companies. Well, there's a company I'm going to talk to later that's interested, and so I hope I can turn the property . . . I know it's a bad time with the price of gold

down at, what, \$258 now, or something? [laughter] At least I hope to keep it tied up, and we won't get much payment out of it, but maybe some company will hit some more gold there. There's several good showings on the property.

So that's my main interest today. I would like to say that as far as my bureau career went, I think I published forty articles, about half of them as in-house bureau reports of investigation and the other half with different periodicals. It's through the AIME or SME, whatever. I had nineteen U.S. patents and a few foreign patents. I was quite an innovative researcher, and, overall, I enjoyed research. In most of the work, the great part was that I wasn't bothered by people above me. [laughter] I did pretty much as I wanted to do, and I felt good about that. It was fun—I'll have to say that much for it. Also, it got my three kids through college and a few other things, so the pay wasn't that bad, although I think it's probably better in private industry. When I look now at my retirement and so forth, I'm quite happy that I stayed with the bureau those years.

At least during that time you didn't have the ups and downs that private industry can have with price fluctuations and resources playing out and so on.

Yes. Well, we've seen the copper mines close here in the state and then start up and close again, and some of the gold mines are laying off now. So, yes, it was a good steady job. My late wife had lived in one mining camp, Nevada Scheelite, and she thought it was a heck of a lot better living in Reno. [laughter]

So forty articles, nineteen U.S. patents—you accomplished a lot during your career.

Yes, and I gave technical talks at around twenty different meetings, including one in

Madrid, Spain, and another one in Fairbanks, Alaska, so, yes, it was fun. [laughter]



Would you talk about your experiences at Cordero related to unions?

Well, when I went to work at Cordero in 1951, we did not have a union; it was a non-union camp, and then along about 1953 these miners started coming in with modern cars, nice Buicks, Oldsmobiles, and hiring out at the mine. This looked a little funny to some of us, because most tramp miners came in on the bus or hitchhiked or got into McDermitt by some other way, and eventually came out to the mine on the candy wagon. [laughter] That's the pick-up that ran in and got the groceries and the mail, which we ran six days a week into McDermitt, which is only eleven miles from the mine.

One of these miners that I'd mentioned before was Fred Fisher, who had been a strong union man. The miners that were trying to organize the union approached the old hoist man, Al Brown. Everybody else that had been approached locally said nothing, but Al ran to management. Al had been with the company right from the start before they went into deep mining, and they did pit mining; he was the shovel operator.

So he let management know there were some stirrings about the union?

Yes, and according to Al, they thought that they damn near had enough votes to unionize. At that point I was company metallurgist, assayer, whatever. I was considered on the staff, and I lived in a staff house. Vern Haas, who was superintendent, called San Francisco, and he came back and said that there had been a crack in the main shaft of the Herschhoff furnace for months, so the plan

was to close the furnace down, and they were going to lay off miners, because they had nowhere to treat the ore. They were going to repair the furnace; they thought it was time to do it. [laughter] So they laid off all the miners and kept a few people, of course. We generated our own power, so we had to have staff at the power house. I think they had a skeleton crew in the mine, but these were the usual locals and the two-shifters and so forth staying on. I think a lot of this came from Sam Williston, who was vice president of Cordero Mining Company. Sam never came to the mine very often, but he sort of had a hand in things, because he went way back with Sun Oil Company. So anyway, they thought that the best line of action was to start a local union, and this is where they got Al Brown and Jess Jaca to form a nucleus. Jess was a pretty sharp young guy and knew everybody, all the locals. He'd been raised in McDermitt. So anyway, Jess asked me, "Gee, what do we do?" [laughter]

I said, "Well, I got a book here." One of the books I had in school on business—it had a chapter on organizing a union. I said, "You got to draw up some by-laws and this type of thing, and then you work with the company under what terms and everything." Anyway, that was my main part, that I gave him the book and a little thing about what they had to do to get started. Probably, yes, being that I worked for the company, this wasn't quite kosher, but this was fifty years ago, so what the hell?

So anyway, they started a local union, and, as far as I know, the union stayed until the end of the deep mining operation. I don't know anything about the later operation when Placer Dome or Placer Development started their operation up there.

So management's effort to ward off unionization was to close down the operation in order to repair the furnace?

Right. The Herschhoff furnace was a section of shafts that was bolted together; it wasn't one long shaft, because the furnace was about twenty-five feet high. So you had five-foot sections. To obtain a new casting of the section, I imagine, it took us at least a couple of weeks, and then they did put the new section in the furnace.

Then they started hiring miners again, and they were very selective not to get any of the guys that had been the union organizers. Most of these union organizers came out of the Coeur d'Alene. When you talked to them, they had been working up in the Coeur d'Alene area. And this would have been the old Mine and Smelter Union, which was affiliated with the CIO union.

But the management of the company, Cordero Mining Company, was not involved in starting a local union. Was that primarily the miners who decided to go for the local union?

Yes, they weren't supposed to be helping establish a union. It came from the workers, and, of course, then anybody that went to work would have to join the local union.

But was management really in favor of the local union?

Yes. Well, they figured it was a way to keep out the national union. The total union would have had to vote a local union to merge with the national. I wasn't up there years later, but I know that when I worked there we didn't have health insurance and stuff, and I think these things came about later with the development of the local union, probably. Also, I think that the company went on a five-day week basis, or I guess it was ten days on and four off. And the miners made the same pay as they would in six

days, if they put out enough ore and so forth, so it was more of an overall contract that they would produce as much ore in five days as they did in six, and I think they had a profit share, but this all came after me.

But this local union was the start of that?

Right. People started taking care of materials and things that belonged to the company. I remember in the old days we'd always have a couple of wrenches and a hammer or two show up in the crusher, because nobody gave a damn. [laughter] I think this type of thing stopped. You took care of your tools.

So it improved things really for both management and for the workers?

Right. Yes, it was good for both, and that's why some of these companies that had profit sharing did well. The workers felt that they were more part of things.

So the fact that you gave them the book that gave an idea of how to get a union started, even though you weren't supposed to be helping—management probably wouldn't have frowned on that?

Well, I don't think management would have frowned on it too much, but the laws . . . I think that it would have been collusion between management and . . . I'm not a lawyer, but yes, I think that the union was supposed to come about from the workers, not from the salaried staff.

You're saying that what you saw was a benefit for both the miners and the management. Do you think that would have been different had it been a national union?

Well, sometimes the national unions were more dictatorial in trying to take over

management and so forth, and they'd call strikes at the slightest problem, instead of negotiating or arbitration. This is what the company wanted to avoid.

It had only been back fifty years to Goldfield and the problems with the unions down there and so forth. So in the state of Nevada, George Wingfield at the Getchell, for example, was dead set against any unions, and I mean, he had reasons. [laughter] I think that *he* felt they threatened to kill him and a few other things in the early days, back when there were the Wobblies.

Yes, so he was against unions, even local union. Did you know George Wingfield?

I'd met him once, and that was all. My grandfather knew him. Of course, they both had been in business together in Golconda back in the early 1900s. I found an ad in the May 4, 1899 *Nevada News* advertising "Golconda Jockey Club Horse Racing on July 1-5." My grandfather, John A. Gomes, and George Wingfield were on the board of directors. My father knew him, also.



Go ahead and tell me about air travel at the Cordero. [laughter]

Well, at Cordero we had a local bush pilot there, Ted Barber, and he lived out at Orovida about thirty miles south. Ted's wife and son had worked at the mine. Curtis worked there in the summers; he was just a student. Ted had taken Kenny Reed, the mine foreman, and Vern Haas out on a ride a couple of times in his plane, and the next thing they were taking lessons. They both bought planes, just Pipers in those days—Piper Cubs. I think Vern's first was a two-seater Cessna 140. So then Chuck Ford, who owned the Quinn River Mercantile in McDermitt, took lessons, and he bought him-

self a plane. So then Kenny Reed had Ted Barber's old plane, which was an Interstate, but it was a two-seater tandem, like a Piper Cub—very similar—with a sixty-horsepower engine. Kenny wanted to get a bigger plane and go mustanging. That's running mustangs out of the hills with an airplane, where you have one or two of the ranchers on the ground to help corral the animals after you run them down a canyon.

So anyway, Kenny said, "Why don't you buy my plane, and I'll teach you to fly for nothing?" I said OK, and Dick Metcalf and I went in halves on the plane. Dick was the bookkeeper, as I mentioned before. We bought the Interstate. I took the lessons, and then I flew down to Paradise to a fly-in breakfast at George Reed's ranch. Les Pearce was also an instructor, and he soloed me. Flying was something I was familiar with, because I'd flown on a B-24. I was a navigator in a bomber crew in World War II. So by that time it sort of came as second nature. [laughter] We had, I guess, five planes up there at one time at Cordero. In fact, I think Chuck Ford bought an old Model A and put it at the airport in Winnemucca, so if any of us flew into Winnemucca we could drive the Model A into town.

We were happy with flying until Chuck Ford flew into Reno to play golf. I believe Ed Brant was the name of the fellow that flew with him; Ed had a market in Winnemucca. Chuck golfed all day, and Ed was at a wedding reception all day—I believe it was his daughter that got married. I guess they had had a few drinks, and flying home they ran into Star Peak. Of course, that was the end of that. Sort of put a damper on the flying up there. About that time I had gone up to Idaho and started working on the company mine in Wildhorse Canyon. So Metcalf sort of cooled off on flying. Actually, he traded the plane in to the local Studebaker dealer on a new station wagon. [laughter]

Were you a part owner in that Studebaker then, too?

No, I think he paid me off a hundred dollars or so for it. Kenny Reed died a few years later in an automobile accident, and I don't know how many more years Vern flew. But it was a handy thing to have in those days—the single-engine aircraft.

It made those Nevada distances a little shorter?

Right. Well, I remember flying into Winnemucca when there was a wind along the highway, and the cars were going faster than us. [laughter] You know, we had a sixty horsepower engine, and the top speed was like seventy-five, eighty miles an hour, and when you were going into a headwind at thirty miles an hour you were only doing fifty-five or so.

And some of the cars back then, in the 1950s—their speedometers went over a hundred, right?

Yes. I know a lot of people who drive between Winnemucca and McDermitt at ninety. I usually drove about seventy-five. [laughter]

Yes. Was there a speed limit back then?

No speed limit. Once you got out of town, in the unposted areas, there was no speed limit. What was "reasonable and safe," I think, was the law. [laughter]

You mentioned closure of a mine that happened as early as the 1950s. That was not Nevada, but I think it's significant in terms of the topic.

It was an early mine closure for environmental reasons. Cordero Mining

Company had an option on the Mount Diablo quicksilver mine, and in the spring or winter of 1955 the shaft at the Mount Diablo Mine had filled up with water. This was the time of the large Marysville-Yuba City flood at Christmastime 1955. The Cordero Company had decided that they were overextended, and they also had an option on the Reed up near Clear Lake. So they decided to sell off their option, and Nevada Scheelite picked it up. I was with Scheelite at this time, and Ray Hendrickson is the one that examined the mine and the records, and decided that the Nevada Scheelite Company ought to have it.

I was transferred down there to be the general superintendent. The first thing we had to do with it was pump out the water from the underground workings. Cordero had found some ore underground. The Mount Diablo quicksilver mine is just a couple of miles out of Clayton on the northeast side of Mount Diablo and only about nine miles from Concord. So we were in a *fairly* urbanized area. People lived out there, and they had a couple of acres. We wanted to pump out the shaft, so we brought in a big pump—we rented it—to lower it down, because the mine didn't make too much water on its own. So we started pumping out five hundred gallons a minute. We started this on a Saturday afternoon, and on Sunday morning we had, I would say, twenty people come up to the mine and complain that we were polluting the creek. [laughter] I should mention that it drained into Marsh Creek, and at Marsh Creek you have a couple of resorts that dam the creek, and they have swimming pools behind them. This was just the week before Easter, and the resorts were to start up on Easter Sunday, I believe, at least that year.

So these people said that they were going to have a meeting at ten o'clock that morning—this was about eight—to talk about what the mine was doing, and it would

be at the Marsh Creek Resort. So Ray happened to be at the mine at the time I was, also, so we went down to the meeting, and there we saw about fifty irate residents. The mine water was pretty acid, and by the time it got into the creek it started precipitating out iron sulfates. So it was turning people's backyards along the creek there orange and various shades of yellow and so forth. The Marsh Creek Resort was probably three or four miles below us, but there were some signs of it there. We did discolor the creek. After we listened to the usual complaints of the homeowners, the owner of the Marsh Creek Resort got up, and he was pretty reasonable. He says, "I like to see you guys in business, but I want to be in business, too. And when your business hurts my business, then we've got to do something."

We didn't know this, but the State of California Water Pollution Board had already drawn limits on what could be put into Marsh Creek, and this was because of earlier operations of the mine and other things, too. The owner of the property lived there, old Vic Blomberg, and he never told us that. [laughter] I mean this might have been a negative that he didn't want out. So we had violated these laws. Actually, they told me later, I could have been arrested right away as the resident manager of the operation.

There were already California rules on what could go into this creek in 1956?

Yes. So Ray and I talked, and then he called Mac, and we decided the best thing to do was to get out of there. While we'd been there, we'd bought a little CAT loader International; we bought several thousand dollars worth of pipe, couple of thousand dollars worth of timbers, and so forth. We took over part of the crew, and one of the crew that came with the mine was Pete Peterson, that I'd mentioned had been a shifter at Cordero. Pete was down there with Cordero, and he

decided to stay with us—or join the new company. So we decided to just haul everything up, get it loaded. Well, there was one of these homeowners from down below. I can't think of his name, but he was about six-foot six, great big guy, and he claimed he was an ichthyologist, a fish scientist, and he worked for Steinhart Aquarium in San Francisco. Well, some of the neighbors said he just had a job over there feeding the fish. [laughter] But anyway, he came up and told me, "You know, I can sue the hell out of your company. My backyard looks terrible."

So I'm looking up at this six-foot-six guy. I'm five-foot-seven. [laughter] You know, he's a little irate, and I don't know, he could be a little irresponsible, too. So all I could do was listen to him, and he says, "Well, I'm going to sue the hell out of you, and we're going to do this and that." I didn't tell him that we had made plans to bring in a couple of trucks, transports, and haul everything we owned out of there. [laughter]

I told him, "Well, I got to talk to the boss." He asked for ten thousand dollars, and I said, "Well, gee, I can't do that. I don't have that kind of money." So, in the meantime Ray had left. "I'll talk to the boss," I says. "Won't be able to get ahold of him for about three days."

And the young guy said, "I'll be back in three days."

I says, "Fine." So, in the meantime we packed up everything, hauled it out, and we were gone within two days. [laughter] So I never saw him again.

And as far as you know, he didn't sue the company?

No. I don't think he had any basis. It was a temporary thing, and the Marsh Creek had a pretty good flow, so it cleaned itself up. He said we killed all the fish, and the natives down there said there never were any fish in Marsh Creek. For some reason they never came in there, not even the suckers and

minnows. [laughter] Suckers and carp and that type of fish. So there were no game fish there.

So the minute that they came and started complaining, did you turn the pumps off at that point?

Oh, yes. We stopped pumping immediately.

And you went to this meeting and listened to the complaints and then went back and had the discussion among yourselves and decided to shut the whole operation down and just leave it at that point?

Yes, the owner of Marsh Creek Lodge showed us the resolution that had been drawn up by the Water Pollution Board. [laughter] And that was the first time we were aware of it. I think old Vic Blomberg went down with us, too, to the meeting. I hated to leave there. While we were waiting to get the mine pumped out, I put the crew on the wagon drill, and we were drilling some exploration holes in the pit. Most of the ore in the early days, well, World War II and before, had been mined in a big pit there at Mount Diablo. God, we hit some hundred-pound rock, and not in just one hole, in several, so we figured we had a block there of, maybe, three or four hundred tons that would average around seventy-five, eighty pounds per ton, which would have been great to put in the mill to start with. We went off and left that.

And you said, as far as you know, this might have been one of the first mines to close down for environmental reasons in this whole area, in California, Nevada?

Right. I can't think of any others that were closed down before the 1950s for air pollution or water pollution or tailings dumps or anything.

And at the very least, it was your first experience with having an environmental impact and having people opposed to what you were doing.

Correct. Yes, it was.

You had some thoughts on the Bureau of Mines and the contrast between early and late years, and you wanted to give us some perspective on that.

Yes. When I first went to work at the bureau, as I've mentioned before, I'd worked directly for Jack Zadra. Jack had been a man that had experience in industry. He worked in Africa. He worked at some of the mines in Colorado and also in Tennessee. He worked for Tennessee Zinc. Then there was Abe Engle, and Abe had worked in Chile and at Cananea, Mexico, and different mining companies. So these men had experience in the industry, and they were supervisors at that time.

Also, I wanted to mention Spangler Ricker. I never worked with Spangler. He was the head of the DMEA, which was Defense Mineral Exploration Allowance at that time, and Spangler had *really* a variety of experiences. He graduated from Penn State around 1910, and he went to Costa Rica. He worked in Mexico, where he was run out in the revolution. He said that the only thing he had was the clothes on his back and a revolver and fifty dollars in his pocket, when he got on a British ship at Mazatlan and sailed out of there. [laughter] He also tells the stories about having a Mexican girlfriend down there. It was in the area of the Zapatistas, and they would raid the mine to steal the dynamite and black powder, or whatever powder they used for explosives. She'd tell him, "Señor Ricker, they come tonight. They come tonight." [laughter]

So he said he'd go up on the hillside, and nobody would form any opposition. They'd ride into the powder magazine, steal the

powder, and fire a few shots in the air, and off they'd go. [laughter] And the mine would order more powder.

Ricker had also worked in Africa with Zadra at the mine at Katanga, and he'd worked in the Philippines, and he put the first drill holes into Flin Flon, which was the big mine in northern Canada, where they portaged. He says they portaged in the diamond drill in canoes—broke it down—and drilled holes up there. So Spangler had a lot of experience. I think that probably some of the other stations had men of equal experience, so coming in these people knew how to deal with the industry, and they knew what the problems were.

In later years there wasn't anybody that had ever worked in a mine, mill, or smelter. I had seven, eight years experience, and I know that I had more experience than the whole Washington staff of about twelve. I'm just talking about metallurgy. In the commodity group and state liaison offices there were many analysts that had mining and geology experience in industry. I had more experience than all of them put together, and they were making the decisions in the metallurgy group. I think a lot of this led to the downfall of the bureau.

I think you're going to find the same thing in other agencies. Talk about the BLM now, and I have rancher friends tell me that some kid that goes to school and takes biology or something, comes out and makes the decisions on this cattle ranch. They've never had any experience running cattle, and they really shouldn't be making the decisions, but that's the way it is.

When you say that's the downfall of the Bureau of Mines, was it that without actual mining experience the Bureau of Mines was not relating to the people in the industry?

I think that's a good part of it. We visited the mines and tried to have them talk about

their problems and so forth, but maybe we just investigated everything there was. You go around maybe for the third time, and Congress got tired of funding some of these things, and there was other competition. The bureaucrats compete for the money. You have all these other organizations that were doing research on their own—NASA, who wants to go into space and, others. Part of the research was geared to health and safety, and, of course, this was moved from the bureau into labor, and so this took another bite out of the bureau. What's left was picked up by the USGS. I think there was a great contrast between the early and later years, because you worked with men that had experience in the industry in the early years.

Was it partly the government pay that couldn't attract people with experience?

Well, partly, yes. Although, back in those times there wasn't that much difference, you know. In the 1950s a mine superintendent might only make six, seven thousand dollars a year. Well, a GS-14 in the government would make that much. So it was comparable. As time went on they were farther and farther apart. I think right now that the discrepancy in wages is *really* great between professional people and the working people.

The industry made token attempts, you know, to try to keep the bureau there, but I don't think they really tried that hard. Of course, they had greater problems with some of the new mining laws that were being considered—some of Bruce Babbitt's ideas, the royalties on mining, the stricter environmental regulations, and this type of thing—that were their first priority.

Do you think it's a loss to have the Bureau of Mines not there anymore?

Oh, I don't think it's that great a loss. A good share of industry does their own research, and, like I say, I don't know if the

GS is doing anything in extractive metallurgy—extraction of metals from ores. But I imagine, if any real problems come up in recovering certain essential materials, that the GS might get involved in this. I guess Department of Energy does some research, too, especially in materials and the physical metallurgy and the utilization of certain materials and so forth.

You saw tremendous changes in the time you were there and since.

Yes, it would be quite a contrast all right.

To the point where that whole organization just no longer exists. Was there anything else that we missed?

Well, the Bureau of Mines was nineteen hundred people nationwide when they closed it, I believe. And when you consider that closing McClellan Air Base in Sacramento put eleven thousand people out of work in one air base in one area, the bureau was really, on a nationwide basis, nothing at all.

Compared to just one military base.

Yes, one military base. I think Sacramento lost Mather and McClellan and another Sacramento supply depot or some other facility there that were all closed down, so they lost a lot of jobs in one area.

Yes. But the nineteen hundred workers from the Bureau of Mines—that was spread out over all the states?

Yes, including Alaska.

At the time that this was happening at the Cordero, were you aware of any other attempts to unionize in Nevada? Did you know about this going on anywhere else?

Well, Nevada Mass at Mill City was a union camp. I don't know when they organized a union or how long they'd been unionized.

And they were with the national Mine and Smelter Union?

Yes, I think so. I'm not sure. Some of them affiliated with the steel workers, and Nevada Scheelite was unionized when I was there.

But for the most part, Nevada mines were not unionized at that point in the 1950s?

Oh, the big ones were. The copper mines were. I was thinking about the smaller mines. Of course, sometimes my thinking doesn't go much beyond Humboldt County, and I was thinking of the Getchell and the Crown not being unionized.

Of course, the early mines of Virginia City—you could follow the history of the union there. Western Federation of Miners was a very strong union, and that was the center of social life, too, the WFM union hall, the union activities, so they were very important in the early days.

The union helped with death benefits and some things like that?

Right. Yes.

Was the local union that was created at the Cordero a social gathering, or was that entirely for a workers' benefits?

I don't think they did anything social. I never remember them throwing a dance or a potluck supper or anything like that. They had those things in McDermitt. We had the rodeo in McDermitt on the Fourth of July, and it's where I tended bar a couple of years.

But those were not really for the union.

Right. Then they always had a big shindig on March of Dimes Day. It was one of the big parties there, and the town raised a lot of money for March of Dimes.

That's different. A lot of the mining towns where I've talked to people, it was either Labor Day or Fourth of July. One or both of those were big celebration times, but I hadn't heard about the March of Dimes anywhere.

Well, that was because it was a personal thing with one of the ranchers' wives. She had had kids with infantile paralysis, and the March of Dimes had helped them. I know they were out on the Oregon side, up at Sucker Creek. They had a ranch there, and she was big in organizing this, and the rest of the town joined in. Of course, the bar owners in McDermitt were always ready to have a party or a celebration. [laughter] It brought more people into town, and they bought more drinks.

Well, thank you for coming back with this information. I appreciate it.

WILLIAM A. HARRIGAN

VICTORIA FORD: *Today is July 15, 1999 and I'm here with Bill Harrigan in his home in Reno. We are going to be talking about his experience in mining in Nevada. Bill, first of all, would you tell me when and where you were born?*

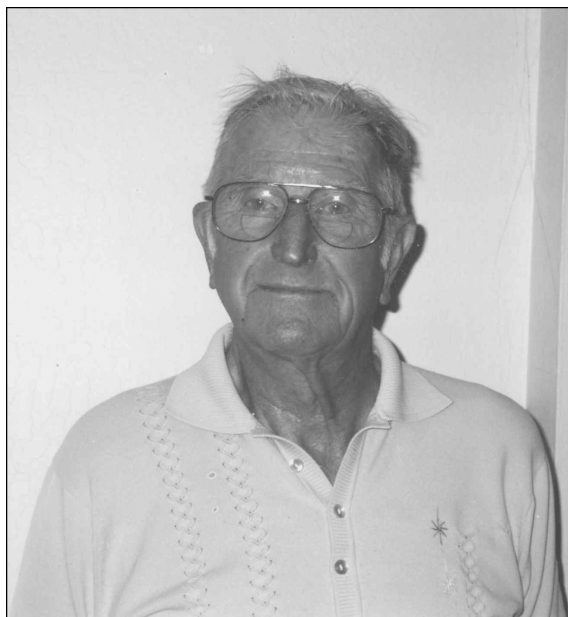
WILLIAM HARRIGAN: Yes. I was born in Gardnerville, Nevada on October 23, 1920.

What was your family doing in Gardnerville then?

Well, my dad was the only one of his family there, but my mother's family was all there at that time. My mother's family was the Andersons. My two uncles had a trucking concern there, and they ran an outfit called the Mono Basin Transport Company. My aunt was married to a farmer out there by the name of Halvor Jacobson. Halvor had a farm. My grandmother and grandfather lived there, but my grandfather had retired, so he just kind of read the newspaper and gadded around town. That guy used to go down to my uncle's garage and pump gas when he had nothing else to do. [laughter] Stuff like that.

What about your dad? I understand that your dad was a miner.

Yes. He was actually born in Union Town, Pennsylvania, in 1882, and they moved when he was just a small boy, probably two or three years old, to Cherry Creek, which is now Denver, Colorado. My grandfather fooled around a lot with coal mining, and he was even in the oil business in the early days of oil. Then they all kind of grew up around the mining business. Later on my dad had some interesting experiences. About 1896 my grandfather got some oil leases in Yucatan in Mexico. He took my Uncle Hugh and my dad, and they were down there for two years. My grandfather with his usual alacrity lost the oil leases. They came back to Colorado and worked in the coal mines again, but Dad didn't like coal mining, so he went up to Cripple Creek, Colorado, and started working Cripple Creek and Victor. Later on he went to another mining town up north called Louisville. He fooled around there in the mines. Then he and a friend went into the tea and coffee business in Louisville. They had that for several years. They finally sold out, and my dad came out to



William A. Harrigan

Tonopah and Goldfield, oh, probably around 1902 or 1903. He was just a young man. He fooled around Tonopah and Goldfield; then he went over to Manhattan.

Did he come specifically because of the gold strikes in the area?

Well, yes. He started following those boom camps. I guess he was down in Rhyolite and Bullfrog. Then, he and a couple of his partners went to Arizona somewhere—I don't know where. They were down there for a while, and he came back, and then he went up to Rochester out of Lovelock. He was there for quite a while. From there he went to Gardnerville. He went to Gardnerville specifically because he and some other guys had a little mine up there called the Ruby Hill—a little copper mine. They had a little mill and stuff, and they would piddle-dee-dee around with that for a while.

I don't think he ever made a nickel off of mining. He was like most of these guys. They put their money into it; they didn't get any-

thing out of it. Somebody come along, and they sold that property and another little mine they had up there called the Gold Bug, which was up in the Pine Nut Hills out of Gardnerville. They sold that and my dad came into town. He knew a fellow there in town by the name of Hoffman. This was probably around 1915, 1916. There was this place called the Midland Garage that was for sale, so Hoffman and my dad bought the Midland Garage. Then my dad just found out there was no plumber in Gardnerville—and where he ever learned to be a plumber I don't know; nobody knows—so he got himself a bunch of tools and set up a plumbing shop in the back. So Hoffman took care of the garage, and my dad took care of the plumbing end of it. We had that until 1923. Then he came into Reno and went to work for Savage and Sons. We moved in here to Reno a few months later, probably in the fall of 1923 or early 1924, and we've been here ever since.

Now, let's go back, because this is a real good outline of where your dad went. Before he met your mom, and before you came along, he was around the mining camps at Tonopah, Goldfield, Manhattan. Then he ended up with the Ruby Hill copper mine at Gardnerville.

Yes, out of Gardnerville. That was before I was born. They had sold that, I think, just prior to World War I. About 1917 they sold that mine, and he came into Gardnerville and went into the garage and plumbing business with Mr. Hoffman. He had us out there doing plumbing, but we had claims. We had claims up until the day he died.

So he spent he spent his whole life involved in mining?

Oh, yes. I had some neat trips with him, though. The first real mining camp that I

remember was about 1927, I guess it was. He and myself and another fellow made a two or three-day trip to Rawhide. There was still quite a town there. You know, there were buildings, and they were poking around. Not like the boom days, but the Grutts were still operating their mine there, and there was a little mining. My dad and this other guy, they had a claim out there, of course. I remember we stayed for two days in Rawhide. Boy, that place just got to me. I *really* was impressed, you know. This was my first time seeing the mine or being around mining people. Now, that kind of gave me a little bit of a bug for it, so from then on I started picking up rocks and bringing them home. We had a nice experience out there. It was lots of fun. I think, probably, it really hooked me on the business.

Did your dad teach you how to do some work on his claims?

Oh, yes. We used to pan, and we used to dig holes. He would take some stuff out, and we would blast rocks. I got so I went with him all the time on these prospecting trips. We had claims out of Virginia City and all over there. He always had an old partner of his. There was one fellow named Winchester that my dad was a partner with. He lived in Silver City. They had some claims down around Como. Later on he had another old partner by the name of Lancaster. They had some claims out of Dayton, over right near where that big old iron deposit is. That was later drilled by someone and is still there. We used to go over there quite often, because we did a lot of digging. We thought we had some good ore over there.

Most of the time when he was out mining he always liked to have a partner, and they were generally old geezers that he had known, or run into, somewhere along the line. They were those old guys that wandered from camp to camp looking for the big strike

and the big deals, and a lot of it, I think, was that they just wanted to be there.

Did you remember any particular kind of characters?

Oh, yes. They were all funny guys, God, yes. I don't really know much about any of them, other than these two that he was partners with in the late 1920s and the 1930s. When the war came along, why, he kind of backed out of the mining because he went to work. He worked out at Hawthorne, and then he worked up here at the Stead Air base—always plumbing and stuff.

So, you didn't get to do as much with the mines?

No. Then by that time it had just kind of gone by the books. He died in 1948. He had been around a lot of these camps, just like Uncle Hugh. Those guys just moved. Well, every time you picked up the paper there was a new boom camp somewhere. There was always a percentage of people that were in Tonopah that decided they had to go to Manhattan. From Manhattan they went to Round Mountain. From Round Mountain they went to Rhyolite and then Bull Frog, and the next thing they went to some other camp, you know. Most of the time my dad worked in mines, and he worked in mills, and he also was an assayer. He did a lot of assaying. They would always get a partner, and they would try to get a lease—that was their forte. They always tried to get a little lease where they were kind of on their own, and if they made it, they weren't digging ore for the company. The only one he ever made any money on was in Rochester. He made a little, did fairly well, not a lot. Two or three other people whose names I don't recall had a mine up there called the Buck and Charlie. They mined a little ore out of that in the early 1920s. They made a little bit of money.

They ended up selling it to a guy that came up from Lovelock. See, he was in Rochester earlier. Then, somehow or another, they picked up this mine from this old guy. In the early days of Rochester he used to load up a wagon full of stuff and go up to Rochester from Lovelock and sell it. He had two old horses named Buck and Charlie, and they named the mine after old Buck and Charlie, this guy's old horses. Strangely enough, that's the same guy that bought the mine from my dad and his partners. They were going to sell it, and this old guy was still hauling groceries, I guess, or something, so he decided he liked the mine and bought it from them. Actually he did fairly well in it. He hit a better ore body than they did. However, we used to still go back to Rochester up until 1931 or 1932 and visit with people. There were quite a few people living there then, and there were people in Lovelock that had been up there. The old guy that was the foreman over at Mills City, he was an old timer, so we'd go over and see him. My dad was a friend of that famous sheriff they had. You remember Chapman? Have you ever heard of him?

Chappie? I've just heard about him recently.

Chappie had been kind of a deputy up around Rochester back in the earlier days before World War I, so we always had to stop and visit with old Chappie in Lovelock, and see how he was doing. It's hard to imagine this guy being the hard case he was with the criminals, because he was this little guy, not a very big man—very mild mannered, kind of pleasant looking, had a little smile on his face. But I guess he was a holy terror when anybody come to town. You know, people just didn't go to Lovelock. If they committed a crime they went the other way, because he would be waiting for them out at the edge of town with his .45, you know, and they

either gave up, or he shot them. It was as simple as that. [laughter] He was a tough lawman. Never had any trouble in Lovelock. Everybody liked him, though. But I guess he was one tough cookie when it came to these criminals; he had no patience with them, whatsoever. Of course, in those days you didn't stand around reading their rights and things to them and doing that stuff.

They would call from Reno and say, "Hey, there's a couple of guys on the freight train that knocked over a jewelry store or something here in Reno. We think they're on the train going there. We're going to have the train stop in Lovelock." So old Chapman—he would get his gun and go down there, and if they didn't give up, he shot them.

Do you remember any times that that happened?

Oh, it happened a number of times. I don't remember specifically, but I guess he used to put up his own roadblocks, too, on the highway then. Of course, it wasn't any kind of a highway. It was a dirt road. He would go out south of town or north of town, set up his little roadblock, looking for these guys that had wheels and thought they were getting away. Yes, he was a neat guy, neat guy.

So, your first experience in mining was with your dad, hanging out with him. Did you attend school in Gardnerville?

No, we moved into Reno in 1923 or 1924, so I didn't go to school until I was here. I went to Mount Rose first and then Billingshurst and then Reno High. I graduated in 1938.

Did you ever have any summer jobs working at mines or anything when you were a teenager?

No, when I was a teenager I used to go out and work on the farm for my uncle in Gardnerville, except for one year, 1935, when I worked for a guy cutting firewood up at Hunter Lake. The CCC guys had just completed a new road up to Hunter Lake. It was a real good road. Cars used to go up there—it was so good then. There were millions of stumps from the old logging days. There was this old guy living here in town named McTaggart. We went up there, and he saw all that wood and decided, “By God, boy, you know this is a find! I can probably make a few dollars out of this.” So that summer he hired me. [laughter]

He got a great big old truck, and we went up there—he and I. We blew those stumps out of the ground with dynamite and then wedged them up and brought them in. His wife was off a ranch out on Mill Street, and they let him pile that wood up out there on

the ranch. Then he went and got a guy, sawed it, and sold firewood all that winter. So in 1935 I did that. Then in 1936 I worked just various things around town. In 1937 I worked for Howell Electric Company delivering stuff.

The summer of 1938 I went to Getchell Mine. It was a gold mine, mostly open pit. The underground was mostly carried on for exploration, just blocking out and drifting along the ore body, sampling it, and trying to get the extent of it, but most of the ore came out of an open pit. They mined two types of ore. They had the oxide ore—well, that was the money crop, because it was fairly good grade, and it was easy to mill. It was the sulfide ore that was a problem, and I guess it always was a problem. The gold was fine, anyway, and it was locked in pyrite. The thing that made it a little more difficult was that the sulfide ore was loaded



The Getchell Mine. “The summer of 1938 I went to Getchell Mine. It was a gold mine, mostly open pit.”

with arsenic. It had those two minerals, orpiment and realgar, two arsenics, and milling it was a problem. They tried roasting it, which, of course, today they wouldn't have been able to even think about doing anything like that. See, the arsenic—the realgar and orpiment—were pretty much inert, and they didn't bother. They weren't even soluble in water or anything, but once you roasted it, it turned out we had an arsenic sulfite or sulfate, and that was going off in a white powder into the air, and it was poisonous. The minute it combined with water, it would form a kind of complex arsenic acid, which would just eat your hide off. That floated out over the country there for quite a few years.

Well, did people have problems with it?

Well, yes! I don't know how in the hell anybody lived in the camp, to tell you the truth, because it looked like it was snowing all the time. This stuff was all over. Animals couldn't live there, dogs or cats, because if they got in the dirt, they would get that stuff on them. It would eat them up. I don't know how in the hell they lived there. Lots of people lived in the camp.

Did you take any precautions?

No. Nobody paid any attention to it. They figured that was the way things went. Yes, they would just roast it in a rotary kiln. Of course, the arsenic would roast. The iron sulfide, the pyrite, didn't roast good in it, because you couldn't get the heat at it. So you couldn't unlock any of that gold that was in pyrite, because that was the wrong kind of a roast to do this, but the arsenic was very easy. A little bit of heat, and it would just sublime off, and when it got up the chimney, the minute it hit the cold air, it just formed a white arsenic. It was all over.

There's an old fellow down there by the name of Clovis Pinson, a rancher. They had a couple of places, one at Golconda and then

one right at the mouth of a canyon called Kirby Canyon. Well, old Pinson—he got pretty smart. Every time he had an old cow, he would take it up there and let it die. Oh, hell, over a couple of years he regenerated into a pretty nice herd of cattle. The wind always seemed to be prevailing north, so that was the direction that stuff would go. The biggest thing they got in there was one time when somebody came through with a herd of sheep, and I think it killed hundreds of them. They had quite a lot of trouble over that, and they were forced to quit this type of roasting.

Specifically over that herd of sheep?

Yes. So they went in, and in 1939 or 1940 they put in a thing called a Cotrell Precipitator. They still roasted the stuff, but it had to go through this thing, which, of course, then caught all the stuff in there, and it would go down. Later, they would bag that stuff and sell it, but then none of it was getting out on the countryside. They had it pretty well contained. I was there when they built that, too. I worked up there in the summer of 1938, and then I went back in the summer of 1939. Then I developed typhoid fever, so I didn't go back to school that year of 1940. They built that in the winter of 1939 and 1940. I was there when they were building that. I worked in the engineering office then for a guy named Earl Seaborn. He's a graduate from the University of Nevada, way back around 1930.

You went to the university here?

Yes. Well, I started the University of Nevada in the fall of 1938. I majored in mining. Somewhere along the line, when I was thirteen or fourteen years old, I developed a great penchant for archaeology, and I got it in my head that I wanted to be an archaeologist. Well, of course, my dad couldn't see this. My dad didn't like the archaeology. He

thought it was a dumb thing. [laughter] We're in the middle of the Depression times, anyway, and there weren't many archaeological schools. University of California, I think, wasn't a lot; it wasn't a big thing. Most archaeologists—I don't think they made more than about twenty-five dollars a month. They put on khaki shorts and funny hats and ran around in tombs. They were generally considered eccentrics. You've seen them in old movies—the typical archaeologist with his little shorts and his pith helmet, and he's running around looking at the Egyptian hieroglyphics and inscriptions, picking up pieces of broken pots. I just finally had to give up on that, because, first off, I knew I could never afford to go to the school to do it, but the mining business was pretty good, and I liked that, so I went on up here.

So your dad was opposed to archaeology mostly from the standpoint that you couldn't make a living?

He figured that I would be running around half clothed and half fed. [laughter] He used to lecture me on it, but I don't regret the mining business, because all my life I puttered with archaeology, anyway, so it didn't make any difference. [laughter] I still do. I've been on digs around here. We dug out old Washoe City. We dug up Steamboat. I've been on a lot of digs with the museum out there, and with Don Touhy—I think that Don is still there—and Bob Elston and those guys. I used to volunteer and go out and dig little holes and recover stuff for them.

So you went and got a different education, but you never gave up on the archaeology?

No, I never did. Of course, I always looked for arrowheads, and I always hiked around and looked at old mining places, anything old and antiquated. I traveled all over looking at petroglyphs and things like that. I read about it all the time; I get the

archaeology magazines. When they first started this environmental stuff, hell, it was just dumped on people rather quickly. I was working for Sierra Pacific Power Company, and hell, all of a sudden, we decided we had to have an environmental impact statement, and they gave you a list. Well, you had to cover the archaeology and the soils and the rocks and the plants and the flora and the fauna. Every time you went out to build a power line and do it down the corridor, why, we would have to do this. Well, they didn't have anybody out there. They didn't even know where the hell we were going to find an archaeologist. I was working there in the engineering department, so I said, "Hell, we got to do it, let me try it." So I was their archaeologist; I was their environmental impact person. I was the whole thing for quite a while until it got to be a big deal, you know. Then they brought in professional archaeologists and all sorts of people. Now it's quite a department. Well, every corporation, or company, that does anything like that now must have it, but I did those. It was good, too, because I learned lots about plants, the names of plants and bugs and animals and trees. I would bring back plant samples.

And you have quite a collection here of things that you've picked up all around the countryside.

Oh, those manos, metates, things like that, yes. You're not supposed to take those anymore, you know. Most of the stuff I've got I've had for years. You have to go a long way away now to look for any arrowheads or anything, anyway, because they've destroyed almost every campsite around Reno, with little or no studies ever made on them. The entrepreneurs came out. I guess maybe they're not supposed to have to do it. It has always seemed strange to me that the power company used to have to do this. Even if we bought a piece of property to build a substation, we would have to do an environmental

impact study on it. Where the people out in Spanish Springs and all over here, and this bunch up on the base of Peavine, they didn't have to do an impact study. Thomas and White Creek, over in back of Rattlesnake Mountain, they just go ahead and wipe them out and nobody says "boo" about it.



Let's go back to your first experience out at Getchell, when they were doing the roasting with the arsenic in the air. What was your job there that summer?

Well, that first year out there I worked on what they called a bull gang around the mill. See, the mine was practically new. It had only started operation in 1937, so it was just in its infancy, for that matter. I worked the first summer up there on that. We fixed stuff, and we installed things and put in machinery and whatever they had to do. It was just like kind of a combination maintenance/construction group. Well, there was about eight or nine of us, and if they had to line a ball mill, fix a crusher, we would go in, pull parts out, put new parts in. If I wasn't doing that I would be outside doing something else.

Explain what it means to line a ball mill.

Well, there's generally a ball mill or a rod mill, or they're like a barrel, essentially. There's an outer shell, which is fairly thick sheet metal, but inside of them, to keep them from wearing that shell out, why, they're generally of manganese iron plates. They were fit into the mill in different fashions, but they were put in the inside. Then bolts would go through, and you would hold them in place by tightening nuts on the outside. When you looked at a ball mill it looked kind of like a porcupine; it had all these bolts, still, that were holding the liners inside. Eventually they would wear out, because of

the balls or rods. Of course, everything would eventually wear out.

And the balls would be just hard rock?

No. They were steel. Iron balls and steel, and they would roll around. They generally weighed eight or ten pounds, and they would just leave them in there. Eventually, they would end up like a little bitty marble. Some of them would come out of the end of the ball mill. They always had buckets full of them there, and the ball mill operator would throw in a few every shift, keep it up. They could always tell. Those guys had an ear, and they could judge just by listening, whether the ore feed was too much or too little, whether they needed metal balls, or what. They were real good at that stuff. You could always tell that everything's going all right when you went down to the mill; the ball mill operator was generally sitting over in his chair sleeping. Let one thing go wrong, and they would wake right up, and they knew just what to do. Those old guys could do that. They were uncanny. They had an ear for that. Strangely enough, though, they considered this a prestigious profession—being a ball mill operator. You went out there, and if they didn't have a ball mill job, you didn't go to work there.

They thought they were specialists, and they were. Those guys were good. All the ore that the mill would handle, they could get it through the mill. They never let the feed hang up and start clattering in there with no ore in the mill. If it got sluggish, they knew it was too much, and, boy, they would get right up. They would change that quickly. Those mill men, they were all that way; they were specialists. Others were known as "solution men" in the cyanide mill. They went around and took samples of pulp and samples of the pregnant solutions and the barren solutions and everything. They had a little place they would take samples. Oh, they would check for the pH of the solutions,

see that there was enough lime, enough cyanide to do the job, and then they took pulp samples, and things for assaying, so you could assay your progress through the mill, if you had stuff over here, and you wanted to be sure that you were getting everything you could out of them before you sent it down to the tailings pond. They were cool. They were people that all considered themselves like professional people, and they *were*. A lot of them had done nothing but ball mill operating for thirty or forty years. Mostly they were guys in their fifties and sixties—older, older guys.

Guys that they had running around washing those clarifier leaves and things like that—they were younger guys—but the highly professional and highly technical positions were always held by these old timers. It was kind of a little thing. You just didn't invade this. That's the way it was, you know.

There was some respect for their knowledge.

Oh, yes. You see, there would be these old guys, and these little things were always kind of appended to their names in a way. "Yes, there's old Charlie Jones, the ball mill man," or "There's Fred Sturdly; he's a solution man." You always had to add this onto the end of their names. They were a little bit above the average bear out there. [laughter]

And the solution man took care of the cyanide?

Yes, he titrated for a slight excess of lime and a slight excess of cyanide, so that he knew that the solutions were not being depleted, and they were doing the job with enough left over for you to detect. Then they would get pulp samples out of the agitators. Every place where the ore went they would take these pulp samples. They would put them in a pressure and filter them down into

a little cake, mark them, and then they would be assayed the next day, so that you could trace your recovery through the mill. Clear down to the end of the thing, you had some idea that everything was going OK.

Do you know about what their recovery rate was at that point at Getchell?

The oxide ore was just magnificent; it was in excess of 90 percent. It was a very, very wonderful ore to cyanide. The sulfide, even after it was roasted, was rather tough to do anything with. Some of that gold, they would probably get 60 or 65 percent of the sulfide out of there. Pretty much everybody, especially a geologist who worked out there by the name of Pete Joralemon, thought really and truly that the recovery they were making was actually free gold in that ore, in that sulfide. They weren't really getting to that locked-in gold.

I went back and worked there again after the war. I wasn't around; I was someplace else, but they put in a multiple hearth thing. You couldn't roast the volume you needed enough. It would oxidize it, but you couldn't get enough. It was similar to those multiple hearth things in steel mills. I think it was called a Bessemer Multiple Hearth Furnace, but it would, apparently, do the job. Gee, the first old rotary kiln they had in there was about six feet in diameter and about a hundred feet long, and then later on they put in two big ones over there that were two hundred and twenty feet long and eight feet in diameter. The rotary kiln—you just couldn't get an oxidizing roast. They were really for calciding. You use them if, for instance, you want to make cement out of gypsum. You run it through there, and you can get enough heat there to drive all the water out of the gypsum. Then you got what you needed for plaster. Of course, the gypsum wants this water back, so the minute it gets it, then it becomes plaster and sets up again, but those were really calciding kilns.

It probably was not a good idea to ever have put them in there.

So, do you think it was experimental that they put them in?

Well, I think it was at first. They had several metallurgical consultants out there, and maybe it was their opinion that this was the only way to go.

Ore moves through these rotary kilns?

Yes. It came in at the top, and they turned. As they turned the ore went down through, but, hell, the only heat you were getting was like a huge jet of flame going up the middle of the thing. Well, maybe it would roast a little bit here, but it never got at the ore to really do the roasting job they had.

This same Joralemon, later on, I remember he thought of another way. I don't know if he suggested it or not—he might have—but what they should've done, and it might have been the way to go in the first place, was just float the orpiment and the realgar. Just run it through a flotation unit, and float that arsenic off in its inert state, and then you would just have these more or less inert minerals. That stuff couldn't bother you. As a matter of fact, I'll show you a piece of it. He figured they could float that stuff off, get the arsenic out of there, and just cyanide the rest of it, and then when they got all they could and rejected it, put an oxidizing agent into those tailings, take it down there and impound it and let it lay there for two or three or four years, and it would probably oxidize itself.

The values were probably good enough, and since it was already ground and mined and everything else, all you would have to do is take it back in and condition it, pulp it up and start it through the circuit. You might be able to recover, maybe, another eighty or ninety percent of what was left over. In those days, of course, gold was only thirty-five

bucks, but there might have been eight, ten dollars worth of gold in that stuff, and they might have been able to recover seven or eight dollars of what was left, because the sulfide ore was, generally, higher grade. It had more gold; it assayed better than the oxide, but the oxide was such free milling stuff that it was the life's blood of that camp. It started going into solution the minute they put it in the truck and started for the mill. God, it was good ore to mill. Great place.

As a part of the bull gang then, you were mostly doing maintenance and work on machinery and so on. Were you also learning things that were helping you for later?

Oh, yes. You see, going to school in those days, damn near all the kids in mining school would attempt to get a summer job in a mine. They would go to Ely, go to Grass Valley and Getchell and all over—anyplace they could get a job. If they happened to be a kid from Idaho, they would probably work Coeur D'Alene, somewhere up there. You always felt you ought to stick in your business and see if you couldn't learn a little bit of something. Well, you did—you learned the machinery in the mill. You learned what it was supposed to do and how it operated; and when it broke, how to fix it. It was pretty good. So I did that the first summer. Then the second summer I went out there, and that's the first summer I worked underground.

Then you went to the mines instead of the mills?

Yes, I wanted to work underground. I was more of a miner than a mill man, anyway, at heart, so I went to work. At that time, down south of the camp, they were sinking little incline winzes, little prospect shafts. You would go down fifty or sixty or seventy feet, then just run a crosscut across the vein. I worked in one of those that summer. Gee,

that was the summer of 1939. We would drill and blast, timber, the whole works.

I'll give you a good story about a tramp miner by the name of Joe Potti, little bit of a guy, oh, probably only about five foot three or four. He was a miserable, miserable little wretch, anyway. They just said, "Well, you go down there and go to work with Joe."

So I said fine. I went down there. We were working swing shift, which would start about three-thirty, four o'clock in the afternoon, and we'd get off at midnight. So I went on down, and they had just started this winze; it was only down about ten feet deep. We finished mucking out, so it was on our side of the timber. They had a pile of six by sixes, and timber, and lagging, two by twelves, and stuff piled up there. They didn't frame it for you; you had to saw it yourself. Well, they just hauled a truckload of timber down and dumped it there. So he told me, "I'll go down and measure, and then I'll call you up. You write it down and saw it up. Then you send it down."

So I thought, "OK."

Well, old Joe, he goes down in the damn mine, and I was standing up there waiting, and he measures, and he hollers up, "Twenty-two, eight."

And I thought, "What the heck is this?" you know. I wrote down twenty . . . I don't know, he's the expert.

And the next one, "Twenty-four, five. Twenty-one, six. Twenty-two, nine."

I thought, "Well, so?"

Then he came on up, and he says, "You got it?"

I said, "Yes, but you know, I don't understand that. First off, we haven't got a piece of timber twenty feet long." I said, "What in hell? What are you going to do with it? What are you talking about?" Of course, he flew into a rage every time you said it. So he whipped out this old tape he had and pulled it out. Well, it was fine, because the first eighteen feet were missing. It was fine, after I knew what he was talking about. He would

give me a measurement; I would subtract eighteen feet. [laughter] Oh, my God, he'd go up to the bunkhouse, and he would whine. He wouldn't spend a nickel on anything. He would go over there, and if somebody left a half a bottle of beer, he would get it and drink it, and he picked up all the cigarette butts, so he could smoke them. He had a little can, and he would roll this stuff up and smoke it. Then, instead of throwing his, he would empty his cigarette butt back in there. Oh, God, he was miserable.

One night we went down to work, and we had an old, horrible, antiquated compressor. God, it was on an old iron wheel, and you had to crank it, and it would backfire on you. Boy, oh boy, oh boy, he would get up there. We went down and couldn't get it going, so I said, "Well, let's see. Let me fool around a little bit with it.

"Oh, no, you'll do it the way I do it."

So I said, "OK."

He got mad, of course, and he grabbed the crank on this thing, and he got down, and, boy, it back fired, and the big old iron crank came up and threw him over, and his hard hat went off. When he sat up the crank was up in the air, and it came down and hit him on the head. Well, God, here he was with a big cut on his head. I saw him; he looked like he had broken his arm or something. He was lying there, but he wouldn't let me help him. He used to make noises like, "Putt-putt-putt-putt-putt." He would go like that, you know, and he wouldn't let me help him. I would go to try and do something, and he would take a kick at me. So I ran on up to camp. It was about half a mile away, but I found the night shift boss, and I said, "You know Joe? That compressor back-fired and conked him on the head." I said, "He won't let me do anything."

So he said, "Get in the pick-up." We went down, and here he was, still lying there. He wouldn't let anyone help him. Finally, this old shifter, he got tired of him. He just grabbed him and threw him in the back of

the truck. Well, we took him up to camp. They had a first aid room, bed and everything in there. God, they got him in there, and they called somebody to come down. We had a guy there that ran the warehouse at dinner. He was kind of a half-baked medic of some sort. So he came down. God damn, we got him in there, and they put a bandage on him. They called Winnemucca and told them we would bring him into the hospital.

Somehow or another, everybody went out of the place and left him in there; they went down to get a vehicle that they could transport him in. When they went back in there he was gone! [laughter] God almighty couldn't find him. So somebody went up to the bunkhouse, and he had gone up and locked himself in his room. He wouldn't open the door, and he wouldn't come out. He was calling everybody names. So, finally, some guys got to fooling with the door, and another fellow went over and just broke the window and got in there and got him. We took him into town, and he fought, tooth and nail, all the way.

He didn't want the medical help?

No! When we were down sinking that little winze, that was kind of soft, and it was easier to use a hand auger with water, rather than a jackhammer or an air drill of any kind. We would drill about fourteen holes to about three or four feet deep, to break the bottom. It was just a tight overburden, and we hadn't gotten into the rock yet. Well, we would be sitting down, and I would get on one side, and he would be on the other side of this winze, which was kind of at a little incline, oh, about fifty degree incline. We would pour a little water and auger those holes. It was pretty easy to do, but I would always beat him. I would always get done first. God, he would fly into uncontrolled rage. "You want to talk about easy son? I need some . . ."

Well, the next night he would run down and get the side I was on. Well, I would beat

him again, and, of course, then I would lay back like this and wait for him. I'd say, "Come on Joe, let's get going here. We got to blast pretty soon."

"A putt-putt-putt-putt-putt." He would go like that. [laughter]

There was this shift boss we had. I don't know if you remember, there was an old guy in the movies, kind of a comedian by the name of Lou Lehr? He was a kind of a comedy character years ago, and this shift boss looked just like Lou Lehr, had a little mustache and everything. We all called him Lou Lehr. His first name was Lou, but his last name wasn't Lehr—we just called him that. Anyway, he would come down to see how we were doing. He would say, "How you doing?"

Old Joe, he would get over in the corner like this and, "Putt-putt-putt-putt-putt." You could hear him mumbling.

Lou would say, "Well, you need timber? You need powder, primers, anything, tools? What do you need that you don't have?" If we needed something I would tell him. Then he would ask me, "What's the matter with him, anyhow?"

I would say, "Oh, he acts that way all the time. Don't pay attention to him." [laughter]

Lou would say, "Yes? He's crazy." So he would go on back up and get in his truck.

The minute Joe would hear the truck go he would jump up, "Come back and fight!" he would say. [laughter] Every time. God damn.

After he got healed up, he came back up to the mine, but he didn't want to stay there, so he drew his time and left, and, oh, a couple of days after he left, why, some other guy wanted that room, so he moved in there. They cleaned the room out and fixed it up, and he moved in. There's a little baseboard around the bottom of the thing, and he happened to be looking down there and saw something was stuck down in behind that damn baseboard. So he got his knife and

pulled it out. It was a bankbook on a bank over in Grass Valley, California. That little bugger had something like sixty thousand dollars in that bank! [laughter]

And you never would have guessed it.

No, because he picked up cigarette butts, and he mooched everything he could. He must have saved every dime he ever made. We never did see him again. We didn't even know where to send the bankbook, because there was no address. He was like the rest of them. He was one of these old tramp miners. When he left he didn't know where he was going. He would get down to the cross-roads and flip a coin, if he had heads left, tails right. He'd decide there. If somebody would come by and give him a ride, he would go that way. We never saw Joe again, never did. I often wondered whatever happened to him, and what he did with his sixty thousand dollars that he had in the bank. And you think, now, this is 1938, 1939. My God Almighty, that was a fortune.

That was like millions now. And that was in the Depression days.

God almighty. Yes, that sixty thousand bucks in that time, you know. Why, God, you would have been considered wealthy. Well, I guess today it would be worth seven, eight hundred thousand dollars or more. God, he had that stashed away over there. They made an attempt to find him to see if he wanted his bankbook, but nobody knew where he went, and he never came back. He was the one that never came back. But he didn't like anybody, anyway. He didn't like anybody at Getchell. He didn't like anybody where he had been, and he didn't like anybody where he was going. That was how that was. That was chiseled in stone, that everybody was a bum but him. He was just miserable, the most miserable man I ever saw. Diggers—that's what you call your min-

ing clothes. He wouldn't buy one of those old blue shirts that, in those days, cost about four bits, and a pair of Levi's, which were about a dollar and a quarter. In the back of the change room they always had a thing called the "poor box," and when a miner quit, he would just throw in his shirt and his pants, and if he had a pair of boots he didn't want, or whatever he had, his hard hat if he didn't want it—everything went in the poor box. Then the next old guy that showed up, if he didn't have any diggers, and he didn't have any money, see, he would go out and rummage around through there. He would get something that could do him until his first payday. But Joe got all his clothes from the poor box; he went through there everyday. Especially if two or three guys would leave, he was right down there to see if they threw away anything. Of course, his stuff didn't fit him. He would get a shirt, and then he would have to cut the sleeves off it. A pair of pants—he would have to cut the legs off it, and then the waist would look like a folded up crease around his middle. Oh, God almighty. He got all his clothes down there.

That had to have made an incredible impression on you as a young man just going into mining.

It did. Like I told you, from the time I worked out there and for the rest of my days in mining, those kind of people *always* made an impression on me. I was like old Damon Runyan; I just loved those people. I got to be friendly with a lot of them—well, with all of them. I knew them all; they knew me.

What was it you liked about them?

I don't know. They were just their own person. They was what they were, and that was all. They were their own man. They didn't feel anybody owed them anything, and they didn't owe anybody anything. They

would show up, and you could guarantee that you got a day's work. They were the best miners you could hire, because they had been everywhere; they knew how to do anything. You could put them in any kind of a stope, crosscut, drift, raise, winze—it made no difference. They would just tell them what shift to go on, and they would go down there. The shift boss didn't have to tell them anything. Hell, they went in; they would look at the ground—a lot of them had worked there before—they already knew what kind of a round to drill. If they hadn't, they would size it up, and just drill a round, blast it, put in their timber, muck out, whatever they had to do. Some of them would stay several months, some of them a week, two weeks, three weeks; but they would always come and tell you, "Saturday will be my last shift." Or if they were running a raise through from one level to the other, if they had fifteen feet to go, they would come and tell me, "We'll finish that raise, and then we're going." When you would go in, the raise would be through and timbered—all the tools there in a nice little neat pile. They would go down the road, and they would come back, three, four, six months later. They would come in, and I would be sitting there. "Hi," they would say. "Got a job?"

"Yes. Yes."

They would say, "Well, OK." So, I would hire them, because we had turnover. We always had turnover in that business, and you didn't pay any attention to it as long as you had these kind of people; you didn't notice it. Why, we would hire them, and somebody would be leaving, and we would send them down to do something. They would go down in the mine to fix up timber or something for a couple of days. Sometimes they would say, "Is so-and-so the shifter on night shift?"

I would say, "Yes."

"Well, I don't like him. Can I go on the other shift?"

I would say, "OK, you go on the other shift." [laughter] They were a great bunch

of guys. Lots of nicknames, they all had nicknames, you know. We had "Two Ton Tony." We had "Cry Baby Tony." We had the "Ski Jumper." We had the "Big Mormon." We had lots of "Blackies"—everyone that was named Black there and any of those miners that had black hair. You would have, sometimes, three or four Blackies working the mine at the same time.

This Big Mormon, he was a real character. His name was Andy Johnson. He was about six foot, nine inches tall. [laughter] He always partner'd up with a guy about five foot, six. They just always looked like Mutt and Jeff coming down the road, but he was a great, great miner. I don't know where he got the nickname. Maybe he was a Mormon, I don't know, but everybody called him the Big Mormon. He would show up periodically. I had another guy named "Five by Five"—five foot high and five foot wide. They were all funny guys.

One of my favorites was a guy named "Big Jim" Dahlgren. Well, I got a story about Big Jim. [laughter] I think this is the only known pie-eating jackrabbit that was ever seen or heard of anywhere. Jim, oh, he's a big guy. He weighed, probably, two hundred and eighty, ninety pounds. He was a mean-looking sucker, Jim. This was later years, see. I'm getting way ahead. This was, oh, about 1951 or so, when we were mining tungsten at Getchell. We had part of a little underground mine that was the old Reilly Mine, and Getchell owned part of it. So we were using their tunnel and then mining our end of the ore body. I had two crews down there, about five guys on each crew. Jim was kind of the little straw boss, shift boss, down there for me on the night shift. Well, one day he came down to the office, and he said, "I would like to have you see something." He says, "It's really interesting."

I said, "What is it?"

He said, "Well, how about coming down tonight?" They come out about eight o'clock in the summertime to eat lunch. We had a

little lean-to out there with a table and some benches, and they would come out and sit down there to eat lunch.

So I said, "OK." I went down about eight o'clock and was sitting there.

He said, "Now watch." By God, up the road about two hundred feet comes an old scraggly-looking jackrabbit. He came up and sat down in the road, and we would just watch him. He'd hop down about fifty feet, and another fifty feet. Finally, he hopped down, and he was sitting right there just in front of us, and he was looking up. So old Jim got this piece of pie, and he opened up the paper, and he set it down on the ground. That old rabbit would come over and sniff. He would take his nose and push the crust back, and then he would eat the filling. He would eat some of the crust until he was full, and then he would sit up, wipe his face a little bit, and hop on down the road. He came there every night, I guess. They found out his favorite was cherry pie. So Jim left orders down at the bunkhouse—and nobody argued with him—that he wanted a piece of cherry pie in his lunch, extra, everyday for his rabbit. Well, God, that got to be quite a thing. I would take people down there to see this rabbit. A lot of people wanted to see this pie-eating rabbit. Well, I guess Jim went into Winnemucca one night, and he's sitting there in one of the saloons, and he got to talking about his pie-eating rabbit. Of course, everybody allowed as how he needed psychiatric help about this stage of the game.

"By God, no, sir," he says. "We've got a pie-eating rabbit." So he got heated up and mad and came back out to the mine. The next day he was ranting and raving, "By God, that bunch in Winnemucca." If they didn't believe him, he was going in to drive the whole bunch of them out there.

I said, "Why don't you do this, Jim?" We had a fellow there who was a photographer. He had this bug. He worked down in the mill, young fellow. Name was Harold Stoll. He had

cameras and movie cameras. Of course, it wasn't like these things we have nowadays. You made the thing; you had to send away and get it developed or run it through a damned old machine. So I said, "We'll go up and talk to Harold and see if he won't go down and make a movie of that rabbit."

"By God," Harold says, "Sure, I will." So the next night, why, we went down a little bit early. By God, the old rabbit shows up just about a quarter to eight, eight o'clock. Why, here he comes. There was still plenty of light; summer was still there. We put the pie over where it was good light so he would eat it over there. This rabbit didn't pay a damn bit of attention to you either. Well, old Harold got down, and, by God, he took a whole movie of the jackrabbit when he came over and started eating his pie. When he got done he wiped his face, turned around, and hopped down the road. The last you saw him, he went down over the edge of the road.

So, Harold sent it in and had it developed and gave it to Jim. He had a little projector, too, so then they went into town one night. Jim set up at one of the bars in town. I think it was a bar called Monte's, right next to the theater. He informed everybody that they were going to come in to see a movie of the pie-eating rabbit. Well, the way he looked, not too many folks argued with him, anyway. [laughter] But, by God, he stayed there all night and ran that movie. People couldn't believe it. I never heard of another pie-eating rabbit. That old rabbit showed up all summer out there, and then he just stopped coming. You could tell he was kind of a ratty-looking, old rabbit. His ears weren't straight, and he looked like he had tufts of fur tore out. [laughter] He might have just gone on. But they must have fed him for two or three months out there. Jim used to go down on Sunday, which was a day off. He would take a pie and go down on Sundays so the rabbit wouldn't feel that he was being neglected.

Yes.[laughter] Rabbits don't know about days off.

No, they just know about pie. By God, he would go down, and he would take a piece of pie for the rabbit.

One day we were sitting up there, and somebody had come up to camp. I guess they had gone by, and there was a couple of kids down below the mine with a .22 rifle. So somebody went up to camp and told Jim that there were some kids down there shooting at stuff, and they might, maybe, shoot the rabbit. He came down. I was down at the staff house. In he come, "Can I borrow your truck?"

I said, "Sure, what's the matter?"

"Some damn kids are down there with a gun. I got to go down and see what they're shooting at." So he went down. Well, they hadn't shot any rabbit, but he grabbed these kids and threw them in the truck and took them back up to their parents and drug them in the house, and he raised hell with the parents. He told them the next time they were down there with that gun he was going to break the gun over a rock. Then he was worried until the next night when: boink, boink, boink, down the road came this rabbit. They didn't shoot his rabbit, but, boy, he thought they were going to. About the time the old rabbit stopped showing up, Jim didn't want to work there anymore. He left, and I never did see him again, either. The thing of it was, he had that film with him—that reel of film. I would have loved to have that thing. Nobody knows whatever happened to it. He probably went to some other mining camp and started telling these guys about it, and they called him a bold-faced liar. So he went and got a projector and showed the picture of his rabbit.

Boy, these old-time miners were very interesting people, weren't they?

They were, and they were all characters. We had another one, Old Mexican Pete. He was quite a guy, I tell you. He was a good miner. All these guys were honest, but that guy there was probably the most honest man I ever knew in my life. Like most of those miners, to look at him, you would think that if you turned your back he would steal your dirty socks, but Pete, I used to loan him money. He worked for me at Copper Canyon and at Getchell. He worked for me off and on for three or four years, and I would loan him money all the time. I'll tell you, it didn't make any difference; I never lost a dime on him. God, he was a good miner. Now, he was a reckless guy; he would go in a mine—he didn't give a damn about boulders hanging over his head or anything else. He'd get up in the stope where other guys would build the staging. Old Pete would get a stoper up against the wall—he was strong as an ox—and he would hold it up and drill it, rather than go get some boards and make a staging to drill off of. God damn. But he was a good miner, and he was quite a guy.

Those old miners—there were lots and lots and lots of them that would borrow money from you, and I never, ever, in all those years, had one of them that didn't pay me back. Maybe they would leave. They would owe me a dollar, and they would come and quit. They would leave, or they would go, and maybe in a month or two I would get a little grubby looking envelope from Bishop or from Butte or from Coeur d'Alene or Kellogg or some place, and in it would be the dollar. Some of them would come to rustle. They would come up and say, "Hi," and the first thing they would do is give me the four bits or the dollar they owed. [laughter] Paid back. Never lost a nickel on those guys. Yes, not a one.

We had another real strange fellow who worked down in the mine. We had a little tungsten underground mine called Granite

Creek, and he worked in the crew down at Granite Creek. He showed up one day, and he looked like he was a pretty good miner. He was kind of a strange fellow, but they were all strange. Hey, you didn't have the psychiatrist interview any of them, anyway. But he worked around quite a bit. So I said, "OK. We need a miner down at Granite Creek. Tomorrow, day shift."

"OK."

Well, I didn't pay any attention to him. When he went up to the mine he had a piece of cardboard about three feet square that he was holding over his head. Well, I thought . . . well, you know. [laughter]

So that evening up at supper a couple of other guys just mentioned, "You know, jeeze, this guy came into the bunkhouse, and he has this piece of cardboard, and when he goes down to the change room or down to the cook shack, he has this piece of cardboard. He held it over his head." Well, we didn't think much of it. Next morning, he's down there with his cardboard, and he got on the little bus we had, and down he goes, gets off the bus, goes over, and goes into the tunnel, leaves his piece of cardboard up there. Well, after two or three days, why, everybody was really getting curious. No, he did a good job. I guess these people would be called crazy now. Well, we just thought they were a little iffy, a little eccentric.

Finally, after two or three days I couldn't stand it anymore. I went down to Granite Creek. I was a mine foreman at that time, so I went down to see him. I went in, and I made a point to go back where he was working in a little stope back there. I asked him how it was going. "Fine," he said. "Yes, I'm going to drill out here and drill out there. I'm going to drill some of these holes."

I said, "That sounds good. You know, I don't know if you resent me being nosy, but I have got to ask you something."

He said, "Well, what is it? Ask away."

"Well," I said, "that damn piece of cardboard that you carry all the time when you're outside, over your head—you put it down when you go in. When you come out you . . ."

"Oh," he says, "let me tell you about that." He says, "Do you know what?" He said, "I read an article about these cosmic particles and cosmic rays." He said, "I read that your body is penetrated by ten or twelve of these things every minute. They're flying through the air." He said, "I used to have aches and pains, and I figured that's what it was. Ever since I've been carrying that piece of cardboard, all my aches and pains are gone. It stops the cosmic rays from penetrating. It's improved my health considerably." He worked at the mine for, I guess, two or three months, and everybody accepted him. He ran around with this damn piece of cardboard over his head all the time, and when he would go into town, he had the piece of cardboard with him, but I think people just kind of accepted these things in those days, you know.

We could have learned something about tolerance from this type of thing.

Yes. They allowed how he was a little iffy, but he got along fine up with the rest of the miners and around camp. One day he came in and said, "Well, I'm going up to Idaho." He drew his time, and away he went. I never saw him again either, but I never forgot him.



After your first summer at Getchell you went back to school, and it was Mackay School of Mines at that point. Tell me a little bit about school at the university.

Well, it was considerably different than it is now, I'll tell you. We just had the one

building, the old Mackay building, and we didn't have a bunch of fancy equipment, by any means, laboratory equipment or anything else, and not a lot of instructors. We had Jay Carpenter who was the head of the School of Mines. We had Harry Wheeler; he was a geologist, and he did mostly historical geology and stuff like that. Vincent P. Gianella, one of the greatest guys that ever set foot on that campus, was the other geologist, and we had Bill Smythe, who was in metallurgy. Walter Palmer was the other guy in metallurgy. That was our whole crew. The classes were small. You seldom were in a class with more than twelve, fourteen at the most. Some of them were smaller than that even. Of course, the campus atmosphere was different. It was strange that even in those days the engineering campus was over on the east side, along from the chemistry building, and then there was mechanical engineering and civil engineering and min-



Jay Carpenter

ing and stuff. The only buildings were those around the Quad at that time, and a few over next to the lake, Lincoln Hall and Artemisia Hall and the dorms. That's about all it was. The old gym we had, which was the old, old gym—that was really an armory that was put up in WWI. When the war was over they gave it to the university. They put a floor in it and made a basketball court out of it. That was what we had for basketball.

The engineering people then, the guys that took engineering, probably, eighty percent of them, were really a bunch of churls, actually. They kind of skulked and thought that they were better than the rest. I don't know, but they had kind of a churlish attitude. They would stay over on their side of the campus, and a great many of them thought it was beneath their dignity to go over there around the library and on the other side of the campus where the arts and science folks were.

And this was engineering, this was not mining engineers?

All engineers. All those engineers were right over in that northeast corner of the campus. I can remember some of them came to school in khakis all the time. They had a Brunton compass on a slide rule; they had stuff hanging all over them. They had a very stereotyped idea of what an engineer should look like and how he should act, but there were a few of us that didn't cotton to that thing, and we would go over to the other side of campus, because, for one thing, there weren't any girls on the engineering side of the campus in those days. You hardly ever saw one. First off, they wouldn't be caught dead over there, anyway. [laughter]

So there were some of us that would go over on the other side of the campus. I even took a lot of courses over there. God, I took political science, and psychology, and philosophy, and, oh, I don't know, English. I took all kinds of courses. Well, I had to work most

of the time, so I couldn't take the full course that they had, their standard curriculum. I would just take what I could, but I would always throw in two hours of arts and sciences of some kind, just to get away from that pack of dullards over there in the engineering side of the campus.

Did you feel like you fit in with that group?

Oh, sure, I fit in with them fine, but I didn't subscribe to their little narrow-minded ways; that was all. I liked them; they were fine. I fit in great with them. There were two or three other guys that used to go over there with me. We would all go over there and have some courses and sit around. We had to do that.

Of course, the instruction was excellent at the Nevada Mackay School of Mines. It was as up to date as you would find in any school of mines, anywhere in this country. It seems terribly archaic now, but it wasn't at the time, and it was thorough. It's amazing how many, many, many of those guys went on to be quite outstanding mining people—geologists, mine operators, metallurgists, and things. All of the stuff we were doing was the same dang thing they did in Tonopah in 1898. The equipment was basically all the same. Oh, a lot has been modernized and updated. Electric motors are a lot better and things like that, but essentially the cyaniding, flotation, concentrating, smelting, and all those things were the same. There hadn't been any great leaps. Some of the textbooks we had were early 1900s, and they were just as applicable as anything else. One book we had was a book on blowpipe analysis, and it had been printed in 1892. To me, that is still the best mineral book I have ever seen in my life. I've got it, and if I want to identify a mineral, that book has got it. There are new minerals, of course, that have been found, but it's amazing how thorough that old book is. It's a great book. The descriptions are

really good. You could get in there and get your classification; you could look through and pretty soon find out about a mineral. It's a good book.

Oh, Jay Carpenter even used to waste time telling us about arrastras. Who the hell would care? My God, the last one of them, some Mexicans used someplace, probably the 1860s or 1870s. I didn't get along very well with Jay Carpenter—I had a lot of classes from him and a lot of clashes with him. The other guys were just great, all of them. As I say, Gianella was one of the smartest; he was really a great guy.

What was your clash with Jay Carpenter?

They were supposed to be mining courses, and they were real dumb. Nobody liked his classes. I don't think Jay really knew about mining that much. Oh, he had a class on mining investments and various things like that. They weren't too elucidating, but they were on the thing, and you had to take them. They were just a rote bunch of stuff that he had been blabbing on. It really wasn't conducive to your gaining a great deal of knowledge in the business, but he taught them; we all went to them. He and I had several fights in there, got into arguments.

Do you think part of that was because you had had some experience around the mines?

No, I don't know. I think it was just a personality thing. It started the first day I went to school. I was driving truck nights for my uncles. They were in Reno at that time. I had delivered groceries to the Sewell Store. Well, this one night the supply truck happened to come in really late. So I didn't get to start my rounds until after twelve o'clock, and by the time I got done it was about five, five-thirty. By the time I took the truck back to the yard, got home, washed my face, and had some breakfast, I didn't

have any time for sleep, and I had to be at this orientation class at eight o'clock. So I was ten minutes late. Well, Jay Carpenter started in, using me as an example of people who are late and are doomed. He expanded from there, and practically the whole lecture was taken up with the fact that the people who are late might just as well go sign up with the devil and be done with it. It just seemed from that point on that he didn't like me, and I sure as hell didn't like him, and we just didn't get along.

Did it affect your completing the courses, or anything?

In the end it did. He made me come back to take a one-hour course in 1948. See, I would have graduated in 1942, but I couldn't take the full course. Then the war came along. I went back after the war, in 1945, and I still worked, so I was just piecemealing my courses to get through. Well, in this one course, he flunked me three times, but the last time I had to go back the spring semester of 1948 to take one hour. I already had all my engineering hours and credits. I had sixty or seventy hours on the other side of the campus. They used to have a thing up there—I don't know if they still do—but if you were that close, and you had passed everything, and you were doing OK, and it came to a matter of graduating, they would let you petition. You could make a petition, and if the head of your school would sign it, then you could waive that one hour or one course. If they deemed that it really wasn't that vital to you, and if you got out working, you would pick it up anyway, sooner or later. No way would he let me. I had to go back and take it again. In the end he gave me a D, just enough so I could pass. Then when I went to get my diploma, I got all dressed up in that stupid looking outfit, and we marched up there, and I went up. They had a little folder and gave it to you. So we marched up,

and they gave us our little folder. We got back, and we all sat down, and, of course, the first thing everybody thought they had to do was open the folder and look at their diploma. I opened my folder, and there was no diploma in it. So, in the next day or two I went back up to the university. There was a lady there by the name of Mrs. Rhodes that ran the office. I went in and asked her, "Gee, you know, something must have happened around here." At the time I just thought it had been an oversight. I said, "I didn't get a diploma in my little folder."

So she said, "Well, I'll tell you. Professor Carpenter told us to hold up on yours, that you might not graduate." Boy, I tell you, talk about mad.

I told her, "Fine. Just forget it. You can keep it. I don't ever want to set foot on this campus again." And down the road I went. I did mean it, too. I didn't give a damn what they did. On the record I had graduated, but it was just the idea that . . .

Did you ever get that diploma?

Yes, I ran into another teacher up there who taught languages, a real nice fellow. I was stomping down the campus, and he said, "What the heck's the matter with you?"

I told him, "I've got a job at Copper Canyon, and I'm leaving tomorrow or the next day. I'm going up to Copper Canyon." I said, "I don't care anything about it." So I just forgot it. By George, I had been out at Copper Canyon two or three weeks, and this little manila envelope comes, and, by God, he had gone up and got my diploma and mailed it to me. So I got it. I still have it. I put it in the folder. But he and I, I think it was just a matter of personalities.

The other students seemed to get along with him OK?

Not too many, no.

He had personality clashes with people other than you?

Yes. Well, most of them weren't ornery like I was. They would just lean back and paid little or no attention to him at all.

I see. But this Vince Gianella, everybody liked him?

Yes. He, Bill Smythe, old Walter Palmer—they were really neat old guys, especially, Vince Gianella. Well, he died here. He was way up in his nineties, you know. After he quit the university, he did a lot of consulting, and he was an expert on bees and honey. Well, he was an expert on just about everything, as a matter of fact. He lived off of Valley Road. He moved down to Auburn, California, and I stopped in to see him a number of times, whenever I would get down that way. The last time I saw him, they had him up here at a big meeting. Somebody had found a new mineral, and they named it Gianellite. They gave him a big dinner and honored him. He must have been in his nineties then—little, bitty, old guy. Those other people up there, most of the instructors in those days, were all really nice, everybody. Some of them were a little straight laced, and some of them had a little bit of what we thought were old-fashioned ideas, at that time, but, by and large, they were all fairly well liked. We thought a lot of those people.



We want to cover a little bit more about your experience in mining before World War II. Do you want to start with your Dayton Consolidated mining experience?

Yes. Well, let's do that. Of course, we were all going to school, but December the seventh came along and Pearl Harbor, so plans were somewhat changed. I couldn't be go-

ing to school. The first part of the year they come up with a thing that would allow you to finish your school year, if possible, so I applied for it, and I was allowed, but it covered more than just the rest of the spring semester to June; it went up to September of that year. So when school was out, in the interim period, I thought, well, I would go work up at Dayton Consolidated. I kind of wanted to work there, and I heard they were hiring guys, so I went and rustled up to Dayton Consolidated.

At the time they were mining through the New York shaft. They had rehabilitated this old shaft, put up a nice steel head frame, and they were mining. They had quite a crew. There were, probably, a hundred and twenty-five or thirty people working for the company at the time. The mill was located at Silver City. They had several mines. They opened it up in the early 1930s. They dewatered the old Dayton Consolidated Mine, which was right at the mill site, and went down and did some exploration, and found a nice ore body, which, of course, warranted building a mill. It was around, probably, three to four hundred tons a day, and they mined out of the Dayton shaft there. We fixed it all up, and they mined that ore body. They also mined in another little mine off to the south of that called the Kossuth. I think it was named after some Czech revolutionary hero or something. They mined in the Kossuth.

Then they went up the canyon. Well, it was right along the road. They had done a little surface work and come up with a little showing, so they did a little work, and there was an ore body that was laying in between the Consolidated Chollar Mining Company and the old New York. Well, they named it the Keystone. They stuck a little one-compartment shaft there about four hundred feet deep, and they mined through that for several years. I believe that little shaft with the little, old head frame, is still sitting there.

The New York is up right on the hill just down from that restaurant, Cabin in the Sky. They mined for a number of years through the Keystone, but it was a small shaft. It was just a compartment and a half—the manway and just one hoisting compartment. The shaft finally started to twist on them, and they allowed as how maybe it wasn't worth fixing up that small a shaft, because it was of limited capacity. So they went right across the street.

The old New York shaft had been sunk around 1872, but it caved in on the top. Well, they went in and cleaned that all out and got it opened up and re-timbered down fifty, seventy-five feet. They went on down, and the old shaft was just intact; it was in beautiful shape, so they just rehabilitated that clear down to the Sutro Tunnel level, which in there was about seventeen hundred feet. All the water in that mine, when we were there, just ran down the shaft, and it eventually went out the tunnel. This was in 1942.

So I got on there at the mine. First I was on the motor crew, tramping crew, for a while, and then I worked up in the stopes, and at the time it was all square-set. Square-set stopes were kind of going out of style—the big heavy timber and all—but they were square-setting and mining around two hundred and fifty tons a day. The ore was pretty good grade ore, at that time, around thirty bucks a ton. I worked up in the square-set stopes until my time was up to go into the service.

Were you doing some of the square setting?

Oh, yes. I learned that working there, because that's all we did, you know.

Who were you working for?

I can't remember the shift bosses, but the mine foreman's name was Al Pierce, and the general manager was Bill Henley. I

worked with a fellow by the name of Milo Janovich. It was kind of interesting up there. That mine was full of characters, too. There wasn't really a big turn over up there, a few guys, but most of them were kind of, oh, guys that had worked around there for years, always had kind of worked around the various mines. When I first went up there, the first two or three days I drove back and forth from Reno. I had an old 1929 Model-A Ford. It was kind of a tough trip, so I thought, "Well, God, I can just find a boardinghouse up here and stay up here."

So I went down to Silver City there—somebody said there was a boardinghouse down there. The old building, I believe, is still there. They had a saloon and everything down below, and the boardinghouse was up above. It was run by a real tough, old gal that they called the "One Arm Bandit." She only had one arm. Well, I moved up there, and boy, oh, boy, I couldn't sleep because the noise in that saloon went on all night. I came to work, and I was up there working with Milo, and I could hardly keep my eyes open.

So he asked me, "What's the matter with you, anyway?"

I said, "Well, I can't get any sleep."

And he said, "My God, where are you?"

I said, "Down at the One Arm Bandit."

He said, "My God, you've got to get out of there." So he had a house up in Virginia City, an old square house, which is still there. He and his wife lived downstairs, and there were four rooms upstairs. They rented these four rooms for five dollars a month. You had to board yourself.

He said, "You go get your stuff when we get off shift, and you come up there." He said, "I got rooms." So I went up there, and that's where I stayed, and it worked out pretty good, because Milo and the other three miners paid me two dollars a month then to ride to work in my car, because we were all on the same shift. We just had to go down to

Silver City is all. It was about a three-mile drive. They each gave me two bucks a month, and it was four of them, so I got eight dollars for the car, and I paid them five dollars for the room. [laughter]

I stayed there until I left. They were awfully nice people. His wife was an English woman, and she was really a nice lady. She loved birds and had a little back porch out there, and she had bird things out there. She was very uncanny, this woman, and I wish I had paid more attention to her. She would go out on that porch; she would stand out there and make funny little bird noises, and here would come the damn birds. They would land on her arm and sit on it all over. It didn't make any difference where she was; she would see some birds, make these noises, and a lot of these little birds would come down all over. I asked her one day, "How the heck do you do that?"

She said, "Well, when I was a kid" She was raised out on the moors in Wessex or Sussex, England, at a railroad. There was nobody there but her mother and her father and her. Her mother taught her school, but she had no kids to play with. She didn't have anybody to play with until she was about nine or ten years old, but there were lots of birds, so she spent her time out on the moors listening to the birds and talking to them. She found out that certain bird noises—other birds would react to them similarly. I was amazed.

We went down on the river out of Dayton one time to get mushrooms—Milo, she, and I. Milo and I went digging mushrooms, and when we came back she was sitting on a log with about twenty or thirty birds hopping around. Now, there would have been something to have recorded, those noises and what she did. She didn't think anything of it. Neither did we, at the time, dummies that we were. What a fantastic thing that was, just those little birds, you know. They would just come down, and they would chatter, and

they would get on her hand, and she would hold them, and they would walk up and down—*amazing*. That was an interesting place to work, too.

Tell us about digging mushrooms.

Oh, yes. Everybody in that country gets those mushrooms. That was quite a thing in this country, Dayton. People from here used to do it. They're great big things, and they grow in the sand down along the Carson River. And they're large, large mushrooms. They were the size of a loaf of bread. They would puff up, and you would go dig them up, and then, these things, you could slice them up, and pickle them, or you'd fry them and use them with steaks.

There was an old guy that used to live in Dayton by the name of Chester Barton, and Chester was another character. He was kind of the Mr. Big in Dayton. I think he was the deputy sheriff, and he owned the gas station and a store. I think he was the head of the water company, and he was kind of the *fac-totum* there. Chester used to get hundreds of these mushrooms and put them up in jars, pickle them. Oh, he could fry them. God, they were delicious. I used to go over and get jars of those things from Chester until he died. Chester was an interesting man. He used to catch rattlesnakes. He had a pen full of them out in his yard. He had a pet lynx that ran around the house. [laughter] It was a large cat, weighed probably, thirty-five, forty pounds. It was defanged and declawed, but it just ran around the house like a dog.

Chester had a big tin thing out in his front yard there, oh, made out of some kind of an old water tank or something, about four feet high, and he used to keep that full of rattlesnakes. He used to pick them up. I went out in the hills with him a couple of times, and he kept picking up rattlesnakes, and I wouldn't ride in the car with him. He would reach down and pick them up and put them

in a bag or put them in his pocket or something. If he had seen a nice one he would want to bring it home, but when he went with me I wouldn't tolerate that, "No way Chester. Either you and the snakes go, and I'll walk, or" [laughter] I didn't care to be in a car full of rattlesnakes, you know. It didn't seem to bother him any, but that's digressing, of course. Well, a lot of people will remember Chester; he was quite well known in the old days. Lots of people knew this guy. He and old Judge Guild—Clark Guild—and Chester used to be partners in mines a lot. Judge Guild was quite a prominent judge here, quite a prominent citizen. As a matter of fact, he was one of the people that got the museum started, and lots of other things. Clark junior lives here in Reno. The old Judge was quite a guy. Old Chester and him had mining claims all over the place together.

I just put in my time up there until I had to go, and then I went into the military. Of course, we did our thing there. Then I got out and came back to school. When I got out of school I didn't choose to work in an engineering office, because I had already done that, and I wanted to be in the production end of mining. So I was just waiting for a chance at a job. I went up to Silver City and went to work for Bill Donovan, who had a little mill right there, just down at the bottom end of Silver City, right along the road. He had a little open pit mine there, about halfway between Goldhill and Silver City on what they called Hartford Hill. I went up there to work for Bill, and I worked in the pit. I ran the wagon drill, and I would blast the ore. We'd drill a bunch of wagon drill holes, and we shoot a bunch of ore down. Also I would break boulders.

What's a wagon drill?

Well, it's a pneumatic drill; they used to call them leyners. It was just like a jackhammer, but it was mounted on a shell, which

you either cranked as you drove, cranked it in, or you had a little pneumatic feed that would feed the drill. When you were done with that piece of steel, you'd run it back and change steel. The wagon drill was similar, except it had a longer shell, maybe ten or twelve feet long. You used long steel. Maybe you could start out drilling with a twelve, fourteen-foot piece of steel. It was on rubber tires, so you could move it around. Everything on it was pneumatic. You could set it at any angle you wanted to drill.

I ran the wagon drill for Bill all that summer. When we didn't need to break any ore or blast boulders, I would go down and work in the mill. I would either run the crusher, if there wasn't anybody else around, or I would go over and wash what they called clarifier leaves.

It was a family operation. Bill just happened to need a little hand on that thing. The people that worked for Donovan all worked for him for twenty or thirty years. He only had about six or eight guys altogether, but they would all work for him for years and years. Well, I just worked there that summer. It was along in the fall I got a call from a friend of mine at Copper Canyon; they were looking for an underground shift boss. Well, this is what I wanted, because I had worked underground enough to know just about what I had to do.

I have a question about the pneumatic drill and the rubber tires. Was this new at this point, or had pneumatic and rubber been around for a while?

No, they had had them for quite a while. The air feed drifters, or leyners, whatever you want to call them, probably came in in the early 1930s. Prior to that time they were mounted on a shell, but they had a little handle on the back, and they had a long screw. You cranked them in, and they ran down, and then when you wanted them you

had to crank them back up to the shell. No, those pneumatic feeds had been in for quite a while, but it was just a bigger deal, and a portable thing to use outside. Underground you mounted them, in those days, on what they called a bar and arm, or a horizontal bar. The underground—when you mount them you put up the vertical bar. The miner would just get back about where he thought he ought to be and put that block, put the vertical bar up, and then tighten that up with a big jack screw, so that it was just as tight as it could get. There was another clamp on it, and it had a horizontal arm on it, and he would mount that. Then on that they had a little thing that would hold the drifter, or the liner, and he put that on and tightened that up. It had a little clamp that held the thing, and he could move that up and down and around and swing it under, and that would hold his machine. Then all he would do is crank it, crank it in. When he got down, why, he would take it apart, and put it out, or some miners used the horizontal bar. They would put it up here, mount the drifter on top of it, drill their top hole and then take it down, mount it a little bit lower, run the breast holes, maybe swing around underneath it, and drill their lifters. Those were pretty much standard in those days for running drifts and crosscuts or tunnels. Any horizontal stuff used these things.

They were later replaced by jumbos, which were somewhat similar to the wagon drill. They had a long shell, and they were mounted on a little track, like a little cart that went on the track. You'd take it and just brace this whole unit against the back and then drill, but they had like a six or eight-foot shell. So with one steel, you could drill your whole round. You didn't have to change steel on the odd eighteen or twenty-four-inch steel changes. Later on, the better thing that came in was the jackleg.

So, let's come back to that. When you say, "drill your whole round," you're saying each

of those: your top holes, your breast level holes, and the lifter holes? And you drilled all those without having to change steel?

Yes. Say you were going to drill a five-foot hole, you would have to use three pieces of steel. You would have a starter, a second, and then a finisher. If you went deeper than five feet, or so, you would have to get a fourth piece of steel, because the change was limited to the amount of room you had running your liner from clear back here down to the end. Then you would come out, and you would have to change steel. But these jumbos were better, because you could use only one. You only needed one, unless you were going to drill, say, deeper than six or seven feet, but you could drill that with one steel. Then when the jacklegs came out, it was the same thing. You could put in a seven-foot piece of steel and drill all your holes. You may have to change a bit, but you didn't have to change steel.

And about when did those come out?

Jacklegs? They started them in the early 1950s sometime, and they became increasingly popular. I drilled a million holes with them myself—greatest thing in the world. The forerunner of the jackleg was a thing called a Mexican set-up. You would just get a regular jackhammer with the handles on it. Instead of going in a place where it wasn't hard drilling, you didn't have to drill a lot of holes. Maybe you were only going to drill a dozen holes in the drift round or something, and rather than go through all that business of the great, big, damn bar and arm, and dragging a hundred-and-fifty-pound machine down there, plus all that stuff, you would just get a regular little jackhammer. There were two ways to do it. Lots of times you just get a piece of steel about, oh, six feet long or so, and get a big nail and bend it like an S. Then put the sharp end of the nail in the top of the hole where the water goes

through the steel. Bring it out, and then you would take a piece of wire and tie it around your jackhammer, and then you would hang your jackhammer on that. It would hold. You still had to hold it and push it, but you didn't have to hold it up. You see, you could always drill in. You could stop and just lift up and kick this piece of steel they had, and it would take the weight of the jackhammer. You still had to push it. There was no way of feeding it, except with arm power, but it was pretty easy to do.

Saved you having to hold the weight of it.

Yes. All you had to do was push, and all you would have to do when your machine was getting a little out of line was just turn it off and quick just kick that thing up again, turn it on, and away you would go. Some guys used to get a lagging and cut a kind of a notch in the top of it and set the machine on that, and that was called Mexican set-up.

And lagging is just a piece of wood?

Yes, say, a piece of two by twelve, or something like that. They would get one long enough to suit their purpose, and they would just cut a V in it and set the machine on that. They would do the same thing, but we always liked the piece of steel, because it was less cumbersome, and it was easier to move, and we used that, too. That was a good thing. When I worked for him that was an interesting job, because you got to do a lot of things. Bill was a real great guy to work for.

Then I got called to go out to Copper Canyon as a shift boss out there, so I took that job, and I went out there right away. It's just about twelve miles south of Battle Mountain. Of course, you got the usual treatment. Well, I wasn't a kid, though. I was twenty-eight years old when I went out there, but I had just gotten out of college, so, naturally, I was a college boy. Well, of course, he

gave me a shift. We had about thirty guys on the shift, two shifts in the mine. The guy that was a shift boss on the other crew was Mel Bruner; I had worked for him at Getchell years before. He was a real old-time miner. Boy, he was good—a good miner. The foreman over there was a fellow named Elmer Snell, and the general manager was Robert H. Raring. You may have heard of him, I don't know. He was quite a guy, Robert H. At the time he had what seemed crazy ideas, which later on I saw them doing. Large open pit mines and stuff like that, heap leaching. Robert had visions of huge mines with great big things, and, by God, he was right. [laughter]

Did he do some of that?

No, I don't think he ever did. It was just things he was thinking about, you know. He was interesting. When I went over to work there, well, I had these guys for the first shift. Of course, right off the bat they were going to give me all of the resistance they possibly could. Everybody had to know what to do: "How do you want me to drill? What hole? How do I drill this space? Where do I drill these holes? How much powder am I going to use? How many of these? How does this work? And how does that work?" Well, it would just drive you crazy. We were using mucking machines, and suddenly none of the guys knew how to use a mucking machine. They had to have me show them how. Well, fortunately, I could do anything they could do, and I could do it better than most of them.

So, about the first crack out of the box, this guy couldn't run his mucking machine. I said, "Well, you go sit down, and I'll show you." Well, I just got in this draw point, and I stayed there for about two hours and mucked about fifty cars of ore. That was more than he could do all shift. Then I had to go around and run the drills. I had to go up in the stope and show them how to run a

stopper. They knew what to do. It took me about two or three weeks before they would accept me, and they finally did.

Oh, they were going to resist, because the college boys were just a bunch of smart alecks, and they sat down there and looked at pictures in books, and they listened to old professors who had never done it, either. [laughter] And they sent them out. They just sent them out to crew, you know, to just pollute the whole mining business.

So, you really had to prove yourself for quite a while?

Oh, yes. It was two or three weeks before these guys finally gave up and did what I asked them to do. After that I never did have any trouble with them.

They had developed this mine. It wasn't a vein; it was just part of a massive ore body. At Copper Canyon, down to about the five hundred foot level, the ore was mostly copper. It was copper and gold with a little silver in it. Apparently, there was a transition there at about five hundred feet, and below that the same stuff had just changed over to lead, silver, and zinc. We went in there, and we just drove right through from one end of it to the other, and then off about every twenty-five or thirty feet put a crosscut to these extremes. Just kind of bracketed it out on the bottom. Then we just started shrink stoping—alternate shrinkage stopes—leaving a pillar about twenty-five feet thick in between. We mined that up about a hundred and seventy-five feet, and it was a pretty good production. We were mining between four and five hundred tons a day, and they were milling it. They had a little mill there—pretty good little mill. It was just a concentrator.

They had originally mined through an old incline called the Virgin shaft, and it got pretty rickety, but they maintained it for a long time. They had sunk a new shaft called the Julie. I think they had drilled this ore body and decided that the old Virgin shaft

was not in a good position to continue mining. It was an old incline, and it was just barely kept open, but when they had drilled this lead zinc business down below, the way the Julie shaft was going, it was in a poor position to mine the ore body. You couldn't use the shaft. You would have to sacrifice a lot of your ore body to keep your shaft. So, they figured it was worth it, and they apparently figured they would continue to work it for some time. So, they sunk a vertical shaft about seven hundred fifty, eight hundred feet deep, and they called it the Julie. It had a big steel headframe, bins, mill, and they had their own diesel generating plant at that time. We were on, I think, the seven hundred-fifty-foot level, or around seven hundred feet, mining this stuff. We just had this series of shrinkage stopes. There were probably about six or seven of them. They were, oh, hundred fifty, two hundred feet long, and we mined it about twenty feet, twenty-five feet wide. We just pulled the ore out, and the work went pretty fast.

You were hoisting it up this vertical shaft?

We had to take it out and dump it, yes, and they hoisted it up. It went up the shaft into some big ore bins right above the primary crusher and from there on into the secondary crusher and then on into the concentrator. When we got done with those shrink stopes, why, we were at the top of the ore. Then, of course, you had a pretty good time, because you could just stand and pull. You didn't have to worry about the miners working; you could pull them dry. You didn't have to leave anything in. That's the thing with a shrink stope: you just break down broken ore, and then you just pull enough out of a stope, seven or eight feet to the back, so the miner could work off it, and then when they blast you would pull it down again and down again. When they're done with the stope, you had all this whole bunch of broken ore in there, and all you had to do

was just pull it until it was dry. So we pulled the shrink stopes dry. In the interim we had run a little raise up the end of each pillar, and subleveled it at about thirty, thirty-five feet to the other end, and then when we got done we just went in and got long hole steel, sectional steel they call it, because you could drill twenty, twenty-five width, and you could do this with a stoper. We would drill those pillars out, and then we would load that whole pillar and shoot the whole schmear. Then we'd go down, and below there would just be a mass of broken ore, and we would just work it out with slushers to where we could pick it up with a mucking machine, and we retreated back. When we got done we had a great big open hole there, about two or three hundred feet. So I guess it was two hundred fifty feet long, two hundred feet wide, and about a hundred and seventy-feet high.

And those pillars had kept it braced up?

Yes. That's why we worked in between them. Then we had to get the ore out of there and hope it didn't cave in on us. Fortunately, it was pretty good hard rock, and we worked kind of around the edges; the ore was out under this thing. You would kind of have to go out there, but they would drill pinholes. We would slush it back into a place where the mucking machine could pick it up and throw it in the car. They were doing that when I left there. I got a call to go to Getchell, and that was in 1950.

Now, that sounds dangerous, when you're taking the pillars out.

It was dangerous. You probably couldn't do this now. I think they would have to change their mining method. It could've been done by another method called subleveling. You would retreat, but you would take everything by mining on sublev-

els, say twenty-five or thirty feet, and you would mine it back this way, so that your upper levels were always out here, and you kept something above your people. You would shoot this off, and you would go down, and shoot all the way down. Peel off a thing, and then start at the top, and come down peel off again.

Were you worried about accidents when this was going on?

No. We never had any. Nothing, other than smashed thumbs and things like that—the usual stuff. I think I was the one that was hurt the most over there. I fell down a raise one time, about thirty or forty feet, lit on an ore car, cracked a couple of ribs, but that was probably the worst accident we had while I was at that mine.

What medical help did you receive under those conditions?

I went over to Winnemucca to the hospital for two, three days, and they wrapped some stuff around me, and I went back to work. Winnemucca was the closest place for a hospital. They had a little kind of a half-baked hospital in Battle Mountain at that time, but I think the doctor was only there two days a week, and it was just more or less of an emergency room. There was a nurse there, and she used to sew up little cuts and fingers. She did pretty good; she took care of these things nicely.

That probably would have been the way that block of ore should have been mined, but this was the way Bob Raring wanted to mine. We had a mine inspector. They never said anything about it. It was pretty ram-bunctious. But mining was different. You used different tools. You had different people. These guys that were mining, they were innovative, and they didn't scare very easy.

They didn't back off from danger?

As a matter of fact, they kind of liked it. See, it was a challenge to them—to see if they could run a vertical raise up there fifty feet without any timber, or something like that. By just putting the ladder up and going up and wedging a couple of boards across, then get out on them and drill around. Take the boards out and pull the ladders out and go down and push the plunger and shoot the thing, and then the next day go up and pick it off and do the same thing. They used to call them bald-headed raises; I don't think they allow you to do that anymore. [laughter] There was a lot of that done. Well, I've done it, too, but it was a different thing. Now, of course, it's totally mechanized. Now there are safety rules. In those days they mined a lot of small veins. And, hell, how are you going to mechanize a two-foot, three-foot vein? There's not much you can do other than just do it by hand. In lots and lots of mines the veins were small and narrow, but the ore was good enough. When I was in Park City we had one fissure, and it would sometimes go down to eighteen inches wide, two feet wide, but, my God, there was three ounces of gold in it. So you could fiddle-dee-dee around; you only had to get a ton of ore a day out of a stope like that to make it pay.

Some of these guys didn't mind working in confined spaces, and they were good at it in all different kinds of ways. Some of them were open stopes, stull stopes. Some of them were shrink stopes. Some of them you used cut and fill. There were all sorts of different methods of mining those little veins, and they did them economically and successfully with the way they did it. I don't think mechanism in those little ore bodies would have even been worth your while. Probably, it would have been cumbersome and more costly than doing it the way they were doing it in those days, because there just wasn't room to do much, and you didn't have to get

a lot of it. Naturally, if you're going to mine a little fissure that's only three feet wide, it's got to be pretty good ore anyway, or you're not going to bother to mine it. You weren't up there doing that with five dollar ore.

So, the mechanization really came along with the lower grades, and the open pits?

Well, yes, and bigger ore bodies and bigger stuff. Then they got into trackless mining, where they would go down and everything was on rubber tires, and stuff like that. Altogether, underground mining is different. It's a total transition from those days. I liked it. I liked my job mining. That was the only place I would work. If I wasn't going to work underground, I wasn't going to work in their damn mine.

You always were figuring out how to stope that ore. Of course, in spite of the fact, everybody was pretty safety conscious. Those miners, 99.9 percent of them, were very safety conscious. They were so used to that that they knew what to look for. They would watch for the loose slabs; they would bar down the backs all the time. The stuff wasn't slop. They piled things up in little piles, and they didn't throw stuff around. Their tools were always put over to one side. Everything was done and taken care of in pretty good fashion. As I say, they didn't mind going out and doing it, but they understood what they were doing, too. That helped a lot. It wasn't running rambunctiously in there. They would size things up before they went in to do anything. Those miners we had there were a pretty good bunch of guys.

There at Copper Canyon we had pretty much a steady crew. We probably had 15 to 20 percent turnover in miners, because most of the guys that worked there lived in Battle Mountain. A few people lived out at the mine. There were several families that lived out at the mine. Raring lived there, and Elmer lived there. Of course, they had a staff house for

the shift bosses; we lived there, and there were two or three other families. It was kind of a little camp. The kids all had to go into town to go to school, but they had a little boardinghouse there.

We had a bunkhouse for the miners that didn't live in town, and then we had a small boardinghouse. I was in the boardinghouse. It wasn't much of a boardinghouse, either. Most mine boardinghouses are pretty good, but that was a bummer. That was a bad one. We had trouble with that boarding house every damn day. The guy that had the boarding house at Getchell wanted to come. If they would have let him take it, we would have had a good boardinghouse. That was a very, very good bunk; very good boardinghouse. They had plenty of food; everything was good. It was a real good boardinghouse, but that boardinghouse at Copper Canyon, God dang it. [laughter] I don't know, this guy that run it, he and his wife were doing the cooking and slinging the hash and everything. God dang it, it got down to where we were having mutton. I think they went out and followed the bands of sheep around, picked up the ones that dropped along the road. Sometimes you would swear it had the wool still on it, and, God, it was tough. Geez, you would have damned old mutton. Then they would have, maybe, just some boiled potatoes. God Almighty, that stuff was awful.

Well, one time I decided to do something to this guy. I didn't like him, anyway. So I collected about, I guess, thirty of those old mutton chops. You couldn't cut them with an axe. I wrapped them all up and put them in a box, and I went clear over to Winnemucca, and I mailed them to him registered mail. Well, it got over there, and he had to go into town to get this. They couldn't run a postal guy. He had to go in. [laughter] He went in and got this box and brought it out, and here it was, these four-or-five-day-old mutton chops in there.

Smelled pretty bad?

Yes. They were on the edge. He never found out, I don't think, who did it, but he was mad at everybody. He wasn't there too much longer after that. They got another guy in; another outfit came in. Of course, in those days not too many people worked in a mine that didn't live there. Most mines had little towns and houses or something. There were companies that did nothing but have boardinghouses at mines all over the state of Nevada, and other states, too, I guess. He started out pretty good, but he went down. I don't think I ever had a good meal in two years at Copper Canyon.

Those miners—one time they turned the table over in there, you know. Damn food. Oh, God, it was awful. He brought out tongue, and he put some ketchup on it, and this is about the third or fourth day on tongue. God, these guys went in, and they sat down, and they put this platter of tongue down. They just got up, picked up the table, and dumped the table, dishes, and everything on the floor. Somebody went up and got Bob to come down there. I guess he got into it with this boardinghouse guy, and they got it straightened out.

Getchell never was a problem with that boardinghouse from the day the mine opened in 1937 until the day they closed up. I think it was Bill Milich from Lovelock. Bill's uncle, Andy Milich, had started that boardinghouse, and when he died he left everything to Bill. Bill ran the boardinghouse, and it was a first-class boardinghouse always. Salesmen loved to come up there, because they always got there around noon or supper time, and they got a meal on the mine. [laughter] We had a guesthouse where they could stay that night if they were late, and we always had quite a few guys come up there.

Oh, there wasn't much in good food and a good bed and good pay and a saloon not too far away. That was about all those guys cared about, anyway, but the food was one of the prime things. They liked to eat, and

they liked to have enough. They liked to have pretty good food—nothing fancy, but good. Boardinghouses were a very important factor in a mine in those days.

How long were you at Copper Canyon?

I was there about two years as shift boss. Then I went over to Getchell from there. At that time Royce Hardy was the general manager, and Bill Newman was the mine superintendent. They were still mining gold ore, but they were mining it open pit, an oxide ore. Although, gold at that time wasn't anything sensational, but they could keep going by mining this oxide that they had. They decided to expand their exploration underground program. So they brought me over, and I worked for Newman. I had the underground end of the mine. We were just driving drifts and drilling, just seeing how much of that sulfide ore we had underground. We were developing that ore as we went north and expanding, just seeing how wide it was and where it went, trying to get some dimensions on it, some estimated tonnage so if they ever wanted to try to do anything with it, they'd know that they have enough ore. We never did mine that gold ore underground at all there.

Were you working with a group of people on that, or were you on your own on this exploration work?

Well, I had a crew. I had about ten guys working for me. We just crosscut it, ran a raise up, sampled it, and kept assay sheets. We were just developing the ore body. As we were going we were trying to mock up some kind of stoping system that may work in this type ore body, if we ever decided that we were going to try to mine it underground, but we never did. The only actual mining they ever did at Getchell was back before the war, and for a little while they tried an

experimental square-set stope. They did that for several months or something, but the hanging wall was gougy, and the ore body shifted. After a while they could see that it wasn't an economical thing to do, and they abandoned it, but it was just a small square set, just an experimental thing. The guy that was the superintendent back before the war, Fred Wise, was a Virginia City boy, and his dad was an old timer in Virginia City by the name of Alec Wise. Of course, square setting was the thing on the Comstock. It didn't make any difference if it needed it or not, you square set. Fred wanted to try it, and he tried it. The guy that was his mine foreman, Bob Spitzer, is still alive. He lives right over here, and I go visit him about two or three times a month. He was born and raised in Tonopah. Bob is still alive and kicking. He's getting along in years, up in his high eighties, but I still go visit with him. I think all the rest of the crew that were out there in those days are all gone now—all the mill superintendents and foremen, all those shift bosses. I know most of those that worked there are all gone.

Now, when you were doing this exploration work, were you again doing shifts?

We just had one shift, a day shift. There wasn't any point in night shift on this. We were just seeing how big it was and sampling it. It was good ore, but how could you mine it? I think it was wide. It got big up there—like eighty, ninety feet. In later years somebody else took over the operation. I think they went in and open-pitted a lot of that ore, because it was big enough. We had a big, new, vertical shaft up north of camp. I think they just took that out, because it was in the way. So it would've been kind of tough underground mining, but I think they eventually went in and took a lot of that gold where it was quite wide down to a certain depth. They open-pitted that thing.

We were doing this, and all of a sudden the tungsten business got pretty attractive. The government decided to subsidize it at something like sixty-two dollars a unit, which was pretty good for stuff that floated around at twenty dollars a unit prior to that. All of a sudden we woke up and found we didn't have any tungsten in there. I think the only place they were mining tungsten was down in Bishop. They were mining it a little bit in Kentucky or some place back there, but, boy, that's all. So it was a boom. We had tungsten properties there, because they had mined some tungsten during the war at Getchell for the war effort, because they needed tungsten for steel and various things.

One day Roy Hardy came out to the mine. He was the manager or something. He called us all together and announced that we were going into the tungsten business as of the next day. So we just pulled everything out of the gold mine, all the tools and everything else, and went down and opened up the tungsten mine. They went down and revamped the flotation units in the mill and changed that all around. Within about a week we were in the tungsten business. It didn't take very long. Yes, we went right down.

Hell, we had two mines to work in. They were open, and one of them had a bunch of ore in the stopes, yet. So we went down quick, got up, and got that stuff rolling, fixed up the ore bins. The rest of the mines, they were in pretty good shape. Hard rock, so you didn't need to worry about caving. We worked one called Granite Creek, and then we worked another underground mine called Riley Mine. We opened up two or three open pits on it, too, and before long we were mining about a thousand tons a day of tungsten ore out there. We were getting about three or four hundred underground, the rest from the pits. They had two or three pits they mined at that time. One

was called Valley View. A little later on, we went up the hill and opened another one called the Tip Top.

The tungsten operation was successful. When I left Getchell they were still mining in tungsten. The Riley Mine is where my old friend Jim Dahlgren had his rabbit. [laughter] That's where the old pie-eating rabbit used to come to see him. He was one of the denizens of the Riley Mine. We had a good go on tungsten up there. They put in an acid treating thing and everything else. When we shipped stuff it was pretty high grade WO_3 . Of course, tungsten just boomed. Nevada Massachusetts, up there out of Lovelock, they beefed up their operation. It never was anything but a tungsten mine, started in 1917 during World War I. They mined tungsten off and on all those years. Then they found some excellent tungsten mines down around Gabbs Valley. There were three or four good operations there.

There were a lot of small operations. Harolds Club had gotten themselves into the mining business, in a way, during World War II. They fiddled around with mercury out of Lovelock. They had a mine out there called the Redbird, and then, somehow or another, the guy that was doing their mining for them picked up a tungsten property right south of Getchell. They did a little development on it, but they didn't do much. I tried to get Getchell to lease this, because it was a pretty good mine, but they didn't like the terms. In the meantime, Harolds had gone and quit the mining business, but this engineer that had worked for them—they either sold or gave him this property. I guess Getchell felt the terms were a little stiff, and they didn't take it. So it sat there. Later on, three guys went down, Bob Spitzer, Bill Hoskings, and Johnny Etchart, a Basque fellow from Winnemucca. They took that mine and opened up a pit on it and made a small fortune in it. They milled the ore at Getchell.

They did really well; they made a lot of money out of it.

Riley was a mine that half of it belonged to Getchell, and half of it belonged to Union Carbide Company in Bishop. We mined through their tunnel and mined our half. Well, they had lots of ore in their half, but Getchell and them couldn't come to any terms, either. So Getchell mined their end of the mine, and the others just lay dormant until this same Johnny Etchart went and got a lease from the Union Carbide Company. He mined a fabulous bunch of ore out of there.

Now, when you were at Getchell was Noble Getchell involved in the mine?

He was at first, in the early years. I think he just kind of sat back. He had some stock or something in the mine, but he used to come over there and visit and maybe go around the operation. They were pretty well involved for some years with Newmont Mining Company. Finally, Newmont had a pretty large chunk of it. It came to whether it was going to be Getchell management or Newmont. I think they had a meeting and decided that Getchell would take it, so I think that Newmont backed out of it.

Maybe you've heard of a guy named Fred Searls. Well, Fred was the guy that used to come up there and see what was going on. I think he was just in the field in those days, I don't know, but he was all over the world. I think he's dead some time now, but he was quite a fabulous guy. Well, Newmont was a worldwide operation, and Fred Searls was just running all over the world.

I remember him coming up to Getchell one time. He landed in Reno on a plane and hopped a flight to Winnemucca, and somebody went in and picked him up. He had come from Columbia or someplace and had on a white suit and a Panama hat. He came

up there, and, my God, he put on a pair of boots, and down the mine he went with his all-white suit. Of course, when he come out he was all dirty. Things like that didn't bother Fred Searls much. He was quite a guy. [laughter]



We want to talk a little bit about a fire at Copper Canyon. Were you there when this fire took place?

No, I had left Copper Canyon and was working over at Getchell Mine. Royce Hardy got a call from Bob Raring that the old Julie shaft was on fire. We had a couple of guys that were pretty well trained in mine safety, and we had a guy that had been a medic during the war; he was pretty good at that, so we piled everything we had in a car and took off for Copper Canyon. Well, it isn't that far from Getchell to Copper Canyon. Of course, we drove eighty, ninety miles an hour to get over there.

When we got there that shaft was just like a blow torch; the flames were probably shooting up there a hundred and fifty feet out of it, and there were a bunch of guys down there. So what we did is go back down the old Virgin shaft, because those workings were all connected. Luckily, we had run a raise from the seven-hundred to the five-hundred-foot level. They were getting the guys up out of this. There was nothing in it except a steel ladder. They dropped that down, and the guys were coming up that ladder. One of them got almost to the top, and he fell down. Well, it was about fifty or sixty feet, or more, so he was badly injured. So we went down and took our medic down with us and a basket. We got the medic in there, and he gave the injured miner a shot of morphine. They got the rest of the miners to pull this basket as they went up. We had

to pull this guy strapped in the basket vertically for a hundred feet until we got up to where the Virgin shaft was, because it was only down about three hundred and fifty feet, and then that was incline. They took him up there.

So then we went back down—Elmer Snell and myself—and we pulled some chutes right off of the station on each level and just filled the drift full of muck to try and keep the fire from going down those drifts, but it burnt the shaft out pretty badly. It was quite a serious little fire. Everybody got out; nobody was injured except the one guy, and he had some broken bones, but that was about all. They got him out without any trouble. We managed to get everybody out of there without having to use any of our equipment even. We just went down, and they all got out. But had we not put that little raise through up to the five-hundred-foot level, those guys would have never got out of there. There were about twenty miners down there, and they didn't have to go to the shaft. They could go over, climb this ladder right to the five-hundred-foot level through another series of raises over to the Virgin shaft and then up to the surface. They were away from the Julie shaft; they weren't near it.

Do you know what started the fire?

At that time Copper Canyon had their own generating plant; they weren't on power. They had a great big diesel generator at the plant there, and it sat up; the shaft was down below. Then the hoist room sat up above the shaft. The head frame was over like this, and the shaft was down here. The diesel plant was right along side of the hoist house, right above the shaft. Well, apparently, over the years some diesel leak or something in a tank had gone down the hill, and some of it got down in the timber. What started the fire was a guy repairing the skip. They had it

blocked off on the surface here, and he was welding. I guess some of the hot, cut metal went down, and got into the shaft. There was some diesel, fairly well saturated, in the timber. Of course once it got started, it just pulled right down the shaft. It was pretty scary for a while, but everybody got out, and nobody got hurt, and that made everybody happy.

Were there any other major accidents that you saw in your time in mining?

No, not me. Accidents we had were what happens with a bunch of guys working a great number of hours in a mine or a mill. Somebody's going to get a smashed thumb or a broken toe or something like that all the time. In Park City, Utah, we had a kind of a premature blast one time that injured two guys, but not too bad. That was a human error, because the way we blast on each level, we would have whatever number of stopes, raises, or whatever was going to be there, and it was all electric blasting. These miners would come down; they would wire their round up in a raise or in a drift or a stope, come down, and hook into that main cable then, connect their round up here. Those cables were all supposed to hang across the drift so anybody walking out could see them. They would hit about waist high. One man had a key to the blasting box, and when he was sure everybody was on the station, he would pull the switch. Well, the guy that had the key, I guess he didn't count right, and these fellows were in the drift, clear at the end. They had just hooked up their round and turned to walk down the drift when he pulled the switch. They got hit in the back with some rocks and stuff, but that was the only time that ever happened. It was a human error thing. It was this guy who just didn't count noses on the station, because it had never happened before, and it never happened afterwards.

Were there mine inspectors going around and checking?

Oh, yes. We had mine inspectors all the time. Yes, we used to have them at Getchell and Copper Canyon. There was a fellow named Art Bernard. I think he later was warden of the penitentiary, too, and then I think he wrote some memoirs. Arthur was a great hunter and fisherman. He used to come out to Getchell and Copper when I was around. I always had to take him fishing over to Kelly Creek. He'd stay one extra day. [laughter] Fishing and hunting were his big things—and hunting dogs. He loved to fish. He would come to Getchell, and every time he would come up, why, we would roll through the mine and do this, and then he would stay over. The next day I would take him over to Kelly Creek, because there were a lot of fish. He would get a great big mess of fish, and we would pack them in ice so he could take them home. [laughter]

Yes, there were mine inspectors. When we were at Park City, of course, we were in a fishbowl there, because we were right near Salt Lake City. All the mining inspectors, to make themselves feel that they were earning their salary, inspected us pretty regularly. It was only about a thirty, forty-five minute ride from Salt Lake City. The thing we had to watch most there was the diesel engines we used for tramming from underground. See, our shaft was two and a half miles back in the mountain, and we had two eight-ton diesel trammers. They had scrubbers on them, and every time they came out, they had to be dumped and new water put in them; we had little testing kits all the time on them. We had to provide so much air into the tunnel for every unit of horsepower on it, so we had a horrendous draft going in that tunnel. Way back and way up the mountain above the raise we had a great big fan. I think it was twenty-five feet in diameter. We pulled about forty thousand cubic feet a minute into

the mine to take care of the exhaust from the diesels. They had to be down, and you could always tell if they were getting a little bit too high. The exhaust from the diesel would have anhydrides or enzymes, and, you see, your eyes would start to burn. But we had to keep those engines fine-tuned. The injectors and everything were changed regularly. Every trip out, these scrubbers were opened and washed out and fresh water put in them. That was the thing they used to watch us on; they wanted to see that we didn't gas everybody, but we never had any trouble with them.

Was electricity being used more than diesel by this time?

In a lot of places, yes, but, no, diesel was coming into its own in underground, where you had sufficient air to take care of the exhaust. It was better. It was more efficient, and it was easier because you didn't have a bunch of batteries, or you didn't have to have a cable overhead, like a trolley cable. There was lots of diesel haulage underground by this time, although a lot of them still used battery motors. Some of the big mines, like in Ely, had tram and trolley's, overhead trolley lines. That was not uncommon. In the small mines, of course, some guy pushed the cars. [laughter]

Well, from Park City, where did you go from there for mining?

I left there and went to Globe, Arizona to the Inspiration Copper Mining Company. Big, big copper mining company. I was in Globe, probably, a year and a half. When I was there I was working on their exploration. We were blocking out a big underground ore body. So when that was done, why, they laid about half of that exploration crew off, and being one of the last ones there, I was laid off. So, I came back to Reno, and then I

went to Pioche, Nevada. I was at Bristol Silver as a mine foreman.

Bristol is a very unusual mine. It's one of these mines where there are no regular fissures or no regular formations. You see, it's a great big thickness of limestones and stuff, in which occur cracks, fissures, and what they call solution caverns. I think Bristol Silver Mining started operating, probably, in the 1870s, and as far as anybody knows they never had more than about two days of ore reserve ahead of time, because you have to just keep looking for it, and you find it. Well, I don't know, they were only getting out a few tons a day. I went down, and we really started looking. By God, we did pretty good.

What we would do there, they had a little fissure or a little crack, and it would show a little of the copper colors and stuff, and we would take and drill that. We had a small diamond drill, and then we would use jacklegs. We had what they call long hole steel, sectional steel, and you could drill thirty or forty feet with that. Of course, you could collect samples. We did a lot of exploring, and we found several little fissures that were big enough. We found two or three more solution caverns with stuff in them. Off the side of one, we found another one that had been mined, and we found a pretty good pod of ore out there. That's the way you did it at Bristol.

Well, we finally got it up to where we were shipping a pretty good amount of ore. We always tried to have one area that was pretty high in lead, because then we would beef the ore shipments. Mainly we were mining copper and silver—very little, if any, gold, but if you could get some lead in there and get it over three percent, you got paid for it. We wanted to get paid for the lead. We had one pretty good, high-grade lead. It was lead oxide. We would dope it up so we got paid. We would get the lead up to five or six percent, and then we could get paid for it. It

was no use giving them forty pounds of lead free, if we didn't have to.

How do you dope it up?

Just mix it. We would just pull out so much of that ore and dump it in with our shipment. If we were pulling ore here, we would figure, well, we had better get the lead. Go in and, maybe, pull ten or fifteen tons of ore out of this place and dump it in the shipment. By the time our ore got handled—in the pockets on the station and up in the top and down and then into the truck and into the car and shipped to Salt Lake City—it was pretty well mixed in. So we got paid for the lead, that was the main thing. All that ore had a little bit of lead in it, anywhere from twenty to forty pounds. Well, you weren't talking about a lot of money, but maybe it was a couple of dollars, two or three dollars. If you got it up to like a hundred pounds of lead, why, it was worth doing. Of course, there was always silver along with that lead, so you weren't hurting anything, anyway. There was absolutely not a real method there, at all. You just get into a bunch of ore, and you dig it out.

Now, in some of those solution caverns, the stuff in them would just be loose fill. The caverns had been eaten out by acidic solutions that once came through, and then the metal solutions came through, and they just got into these big caverns. A lot of times that stuff was just loose in there. It was just like loose dirt and rock and stuff. You could just pull it out. Oftentimes, those solution caverns along the walls were lined with real high-grade stuff. We would try to snipe that off if we could. We had found one there that was just like a long pipe about twenty feet in diameter. We had a little lead that went in, and we drilled in. It looked pretty good, so we went around and ran a little drift into it, or a little tunnel, so we could get a mucking machine in there. We just stood there, and

that thing just pulled ore from, oh, two or three hundred feet up there. We just pulled that out. Off of the wall of that thing was a lot of pretty good-looking copper ore. So we went in then and ran a raise up right along side of it, and we scaled the inside of that whole thing. Oh, we got a lot of good ore out of it. That's the way you mined at Bristol.

We had one fissure down on one of the lower levels, and it was kind of a little fissure that was wide enough to mine. It was very good copper ore, pretty high grade. We kind of mined that by a little shrinkage stope method, but that was the only fissure we ever had when I was there. We found loose caverns that went below us, so we were going down and mining below ourselves, pulling stuff out with a slusher. You would get anything you could down there, that's why it was a neat mine. We didn't have any methods there. Nothing at Bristol that you could put to even the most loosely standardized method. You mined as you found it. You did what you had to do. Every little hunk of ore you found, you did something different. That's why it was so neat, because we would just have to think up ways to begin, "How are we going to do this?" We would go in underneath, run a little drift over, and come up. "Or shall we try to get it underhand? What are we going to do?" That's the way it worked, and it was a good mine. It was a darn good little mine. They say it had been in business since about 1870. It was an old mine.

A fellow by the name of Paul Gemmill was quite the authority on the Pioche District. Paul wrote a very, very fine report, years ago, on Bristol Silver Mining Company. Paul had worked there as engineer, too, in the 1930s or back sometime in the olden days. He had been around; Pioche was kind of Paul's territory, and he had the same experiences running around finding little stringers to picky poke on, or maybe put a few rounds in and see if they widen out, or if they pinch down.

Do you remember who your boss was there?

Yes, Byron Hardy. He was one of the first guys out there with the Newmont project out of Carlin. I imagine Byron is retired now.

I think he's in Arizona. In fact, I was hoping to get a chance to talk to him.

He was the guy I worked for when I was down there. I've heard that he retired. I think he stayed with that Newmont project for a long time out of Carlin.

How come you left Pioche? Do you remember what was happening there?

Well, there was a little parting of the ways between me and Byron, and it was just better that I leave. There were some personal things, not with Byron, but with me, and I was married at the time—that had a lot to do with it. That old bat I was married to was responsible, basically, for the whole thing. So I left there and came back up to Reno. There weren't any mining jobs. Hell, by 1960 mining was just flat on its face. They had kicked out the tungsten subsidy. Gold wasn't worth a dang, and silver wasn't worth a darn. A few big companies were producing all that was necessary of the base metals, copper. You could go overseas and work, but who wanted to do that? I didn't.

So, I worked for Harrah's in Reno in the slot machine department for about a year, just to fill in. It was kind of an interesting job. It taught me all about gambling. I've hated gambling with a passion ever since. I won't go into a gambling joint. I think they're the vilest creatures on the face of the earth. It also gave me a pretty bad look at human nature—those saps that keep coming back there giving them their money. That kind of soured me a little bit on people. I lost a lot of the compassion that I used to have for the

human race. So I got out of there. That wasn't working very well. I went to work for Sierra Pacific Power Company as a senior civil engineer, and I stayed there until I retired in 1983.

Now, about the time you went to Sierra Pacific, didn't you do some mining around Peavine?

Yes. When I went to work for the power company, I ran into this old fellow, Julius Redelius, who had been around town here for quite a few years. He was in real estate; at one time he sold stoves. He had a chicken and egg farm down somewhere, and he owned quite a lot of property on East Fourth Street at one time. His brother was around here, too; he was in real estate. Julius did a lot of different things and had a little money. He built motels; he had two or three motels.

Julius picked up some claims up on Peavine, and it got to be his hobby. He would go up there with a bulldozer, and he would make a cut or something, and, God, he would show up a little ore. Then he wanted to run a tunnel. Well, I had known Julius before. I was talking to him one day, and he wanted to know if I wouldn't come and do this for him. So I said, "Sure." He had good equipment. We had a good compressor, jackleg, and everything. We had to hand muck; that was all. I would drive these drifts on these things for him. We drove them all over the place up there. It's just straight up almost due west of Stead. If you're going out the highway, and you look up on the hill there, you'll see a kind of a dump. He had made an open cut there, and he was looking around. In 1867 a fellow named Hatch drew a map of Peavine, and at that time Hatch called this thing the Persia Lode. In later years, after 1900, it was set up as the Red Metals Mine. Actually, in 1910 and 1911 they shipped quite a little bit of ore out of the Red Metals Mine. Apparently, there was an old tunnel that they had driven down there. It was said

to go in about twelve hundred feet. They had intersected a vein in there and found a pretty good pod of ore. They allegedly shipped, oh, twelve hundred tons of fairly good ore out of there. Well, that was about the end of it, I guess, and then Julius picked it up. Some of the claims were patented, and some weren't.

And is this the same location that you referred to as Poeville?

No, no. Poeville is down in a canyon below that and south of that. It would be south of this area and further down the mountain, down in a canyon, before you really start going up Peavine. Poeville was an old camp. They had a little boom in the 1870s. Pretty exciting, I guess. Rich ore. Pretty good ore, but not much of it. They kind of died on the vine and faded out. They came back in the 1920s, and somebody reopened some of those things. They had a small mill there. They tried to mill something but it wasn't very successful. Well, then people kept picking up those claims. There was some outfit in Grass Valley that came over, and they opened up one of the old shafts, retimbered the top of it. We were down in there sinking a little incline on a small little stringer of ore. God, it was only about an inch and half wide. It was pretty good, but you couldn't get a bucketful of it for a day in it. We worked in there, sinking on that winze. It was awful wet, and the water was really cold. We sunk that down quite a little ways, and then one day they decided to abandon the project. They had spent quite a bit to get that shaft reopened. It was down about a hundred and fifty feet. I worked up there for about six weeks for them. They finally just came over one day, and we pulled everything out and loaded it on a truck, and that was the end of it.

Did you work for Julius for a while?

On and off for years. Just on Weekends.

And did he make some money off of that?

No. He never shipped a pound of ore, but he liked what he was doing. He probably ran a thousand feet of tunnels up there—drifts, crosscuts. He just liked to find little pieces of ore. He was always looking for the big bonanza, but it didn't bother him any, because he was having fun.

So this was while you were working for Sierra Pacific?

Yes. I would work on weekends up there with Julius. Of course, in the winter we couldn't get up there, so we didn't work, but during the summer we would maybe work Saturdays and Sundays, and it was kind of fun. We found little pods of stuff along there. We found some little pockets of really rich ore, but there was maybe a hundred pounds or something like that. It would be just almost pure metal. The copper would be 62 percent, four hundred ounces of silver, but what are you going to do with a hundred pounds of it? Give it away for specimens, that's all. You won't get what he did with it. [laughter]

I would like to ask you a little bit more about Peavine. The general public doesn't necessarily think of Peavine as a location where mining would be a possibility. They see Reno as a place to live and develop, not mine. Do you think that's accurate?

Well, somebody has always thought there was a possibility on Peavine. Probably, the first work was done up there in the 1860s. As I say, this fellow Hatch mapped Peavine in 1867. There has been digging on Peavine. Some ore has been shipped; Red Metal shipped some. There are two or three other mines over there that have shipped a little bit of ore, not a lot, of course, not in Peavine. Through all those years of digging up on Peavine, very little ore was ever found. You

would always find just enough to tease you, just enough to get a little assay out of it, just a little streak, and it always looked good. A few mines did fine and shipped a little ore.

The Wedekind, which is clear over right north of Sparks, was a pretty good property. Wedekind was the best mine around this area. It was found first. Now, the Wedekind is in the same general formation. What we have over on Peavine and across there is what's known as the Alta andesite, or Alta formation, which is the same formation that the Virginia City ores occurred in. There's also several intrusions of Davidson diorite, which is the same age and the same consistency as the Mount Davidson, which was thought to be the start of the mineralization of the Comstock. The problem with this out here, it was all done just by picky poke, and never was a concentrated study by a competent geologist, crew, or team. There was never a structural study made to see if there was a structural control. There are probably some excellent mines out there someplace, but nobody knows where they are, because they've never been drilled. If that country had been out here fifty miles, there would've been twenty thousand diamond drill holes in it by now. You can't touch it now. What are you going to do with it now? If you found a mine, you couldn't mine it. The town is right on top of it. They're not going to let you mine.

The Wedekind, though, started out at about the turn of the century. It laid there, and it was found as a surface ore. A guy found some very good silver along the surface. I think there was several hundred thousand dollars taken off of the surface in high-grade silver. Then they went around there and formed different companies, and they sunk, probably, half a dozen shafts down to about two hundred feet that were very wet. The water was really bad; it was highly acidic and stuff, and they started to pump it. When they pumped it, it got into the Orr ditch, so there was a series of lawsuits. There were several

attempts to do something with it. There was some good ore found in the one mine called the Arkell Mine—some good lead and silver ore—but not much. It would only go down so far. You got in, and it was water, a lot of water, and you couldn't do much with it. So they never were able to do much with Wedekind. It may have been the key to a good location. However, I understand that in the 1920s, about 1922, 1923, west of where the Wedekind group of mines were—now underneath a bunch of houses—there were a couple of churn drill holes drilled for exploration. Churn drill holes just bounce. It was on a cable, and you just picked it up and let the bit drop. It was a cable tool. I think they drilled some holes down four or five hundred feet, and they found quite a lot of pretty good zinc ore down there, but nothing was ever done with it.

It may have been feasible to do something in the 1920s, but it wouldn't make any difference, now, if you found anything out there anyway. You couldn't mine it. I'm sure it's an excellent formation. That whole Peavine extends all across the southern face of Peavine, right into where you go into Spanish Springs Valley, and then those formations dip down and disappear from sight. It's covered over there by the Pleistocene, Pliocene lake beds, and then the later basalt flows that you see there now.

When Julius was there, he was in a different rock. The northern face of Peavine, up in that country, is primarily what they call metavolcanics. They were old metamorphose, volcanic rocks. They're older rocks—Jurassic, Triassic rocks—while most everything else around here is in the Tertiary, the Alta Tertiary. It's probably Miocene, I guess, Middle Tertiary. There are a whole series of rocks there called the Hartford Assemblage, and they are the tertiary rocks. It covers a period of about forty million years.

So, although you kept involved in mining on the weekends, that was no longer your main job?

No, it never was again.

What made you leave mining?

Well, there weren't any jobs for me. By the time I had in four or five years with the power company, I liked working for them; that was a good company in those days. I liked what I was doing and settled down here in Reno. I was in my home town, and I just thought to hell with it. Why go running all over the country? Of course, I wouldn't know what's going on in mining today if I went out to a mine.

Well, tell me what kinds of work you did for the power company that you liked it so much.

Oh, hell, I was kind of on my own. I did everything, anything. I did surveying. I laid out jobs: substations, pipelines, pump stations. I worked on the flumes at power plants. I did everything. Construction work—lots of construction on the ditches and things like that. We did all kinds of construction. I worked with some really good people in those days. The construction crews were really good to work with. Although I was an engineer, most of my business was field work. I didn't do much office work, and when something would come up, I would just go take care of it. It was a very good job. I stayed there for twenty-two years. There wasn't anything wrong.

Then it finally started going the way of all modern companies. They started getting computers, and they started robotizing the employees and programming them and doing all kinds of funny things—having too many meetings, too many memos, and not

enough work. We used to have very few meetings. If I were working on a job with the power company—on a substation, for instance—I would go do business right with the tests-and-measure people and the guy that was going to install all the equipment. First, I would do business with the construction guys. They were going to do the earthwork, often, and they would also pour all the footings, but you didn't have meetings with a bunch of people that weren't concerned.

Then they got to having meetings about a little substation that we used to just go and do face-to-face and settle our business, and that was all. I would go ask, "What do you guys want poured first?" So we'd do it. "And you can come in and start building." That would work out, but then they got so that they would have a meeting about a substation. You would have fifteen, twenty people there, and fourteen of them or twelve of them had nothing to do with it. It wasn't any of their damn business, but everybody would have a clipboard and come to the meeting and sit there. Most of them would go to sleep, but they liked to have meetings, and you got the continual barrage of memos, which I guess is now the "in" thing. I don't think anybody thinks anything of it, now, but I retired a little early, because I got tired of that.

That isn't your style of operating?

No, no, no. It was the old fashioned way, and that doesn't work nowadays. You can't do anything that way anymore.

You can't go out and make independent decisions?

No, you don't go out and do things anymore. You got to go on the computer. Even if it's wrong, it goes on the computer.

It seems like at all of these places where you worked, you had a lot of independence to make your own decisions.

Well, they used to give you the jobs; that's what they hired you for. If they figured that you knew it, they would put you over there, and that was it—you were supposed to do it. They didn't hire you to train you and babysit you. If you didn't do the job, why, then you could either quit or get canned, one of the two, and it was accepted as that. You took the job, but when the guy gave it to you, he would open your little paper and read that you were capable of doing it, and you'd go out there, and they would expect you to do it, and you did.

At a mine like Newpark, we did everything on our own. We couldn't bother having a meeting every time. The mine foreman and myself, maybe, the shift bosses, the engineer, the geologist. It would be the engineer and the mine foreman. They would go down and make the decision—or the geologist and the mine foreman. "This stuff wasn't any good, so don't mine this, but can you get over here?" Well, then they would have to figure out how to do it, and they would do it on their own. We didn't have a committee running the thing. Every guy had his department, and the departments all had to mesh and make the whole thing go, but each guy had his own, and we didn't interfere. I never interfered with a mine foreman over there very much, because he was a very good man. When I got the job, we changed everything around, and I picked him, and then he picked his own shift bosses. I had nothing to do with it. He picked two of them that I wouldn't have had. That was his business. [laughter] Somebody would say, "Well, OK. That's it." The shift boss would go get a crew and send them over there, and they would start doing it. That was the way it worked. The six years that I was there, the president

of the company never bothered us. The vice-president tried to, because he was that sort of a person, but fortunately the old man Cranmer didn't let him bother us very much.

As a matter of fact, though, this vice-president is the one that finally nailed me and got me canned up there. He pulled some pretty rotten tricks, but it worked out all right. I hated to leave there. That was the best mine I was ever in. It was the best job. Park City, in those days, was the best place to live, too. It wasn't a ski joint then, just a little, dinky mining town. Oh, I loved it up there. I'd have been there yet if that mine would have kept going. Of course, when they started building the ski resort, I would have left.

Were you having to deal with any of the big, new environmental rules when you were on any of these jobs that we talked about?

Very seldom. What was done was pretty loose there. If the company itself wanted to try and safeguard things, of course, they would do that in the working areas, in the mills and mines, but there wasn't any dumping stuff around and doing that. No, I'd say at that time there was not such a thing as an environmental department in the government. Nobody had ever heard of it. There would be local problems here and there, and then, not only in mining, but in all other industries, but then somebody would try to clean something up. Occasionally, somebody would get fined for dumping waste or toxic things around. They would either have to stop it or clean it up, but it wasn't like it is now.

Were you ever around when any of those fines were assessed?

Just at Getchell Mine when we had the arsenic problem up there. When they were roasting that sulfide ore, the arsenic would

get out in the air all over everything. Strangely enough, even then, it was all over the camp and everything else. You couldn't have pets up there, animals. This stuff would get on you, and if it got damp, it would form an arsenous acid, which would start eating on your hide.

A bunch of sheep came through there one time and died from the arsenic. The Getchell got into quite a lawsuit, and they had to compensate this guy for his sheep, and that sort of thing. They changed then, and they built what they called a Catrell precipitator on the end of the arsenic roasting thing, and that caught all the arsenic. Very, very little, if any of it, was going out. They caught it all then as a white powder, and they marketed that. As a matter of fact, during the war they let Getchell run a little bit of sulfide ore through the mill for the arsenic—for something the government wanted. They could produce a small amount of arsenic. What the government wanted was a very minimal amount, so Getchell milled sulfide ore for a while and roasted it, primarily, to get the arsenic, but that was the only thing. They had other things. There was always somebody complaining about something, I guess. It was all just kind of accepted in those days. That's the way it had always been.

What about women, did you see any women out in the mines, or underground?

Not while I was in it. No.

Was there still a superstition about women underground?

Yes. Well, you had to be very careful sometimes, like if some ladies would want to go and look at something underground, to be damn sure that they didn't have a couple of those superstitious guys down there, because they would just throw their tools down and walk off the job.

We would always feel them out, if they wanted to go look at something. You know, some of them were curious, and they wanted to see. So we would put a hard hat on them and a pair of boots, and they could go down there, and we would always kind of make sure that they didn't upset anybody. Lots of them, even if they'd only heard about it, would quit. Some of those old tramp miners still believed in that. We didn't have any women in the business, anyway.

Before I even started the Mackay School of Mines, I think there were a couple of women that had gone to school. One of them graduated about the year I started. I think she subsequently went to work for the *Engineering and Mining Journal*. She never really stayed out in the business too long. I understand she was at the *Journal* for years as a feature writer and did really well, but women weren't accepted, and it was a rougher business. You didn't have calculators. You didn't do anything like they do now. All of them, men and women both, they now sit in there and punch calculators. They don't do anything else. A woman could be in the mining business now, because you don't even get dirty, I guess. You only rarely even leave the office.

When they drive these great big, huge haul trucks, it's pretty amazing. But these are not at all like the haul trucks that you were around.

Oh, no. Well, the trucks we had at Getchell were probably fifteen tons or something—biggest ones we had. They used railroads in the early days in Ely. They had tracks and trains. They used to just ride around, come out, and go up to the concentrator.

Were there any other superstitions that you ran into with the tramp miners?

No, not particularly. They were weird folks, but looking back, there are stranger people running around loose now than ever these kind of people were.

Did they ever talk about the Tommyknockers or any of that?

Oh, yes. Well, they used to have those. We didn't have too many of those. They would confine themselves pretty much to the California mines over in Grass Valley and Nevada City, up and down the Mother Lode with Cousin Jacks. That was their favorite superstition. We would hear about things. Oh, we had guys that would hear strange noises and voices and stuff. Well, I've told you about how weird some of these people were, but other than that we didn't think too much of it. I don't know. I think everybody was a little more tolerant or something then, you know. They would say, "Yeah, there's old so-and-so. You know, he's kind of a little bit dingy, but that's all right. He's a good guy." [laughter] So on, so forth. It was pretty good times.

Are there any other characters that we might not have covered?

No, I can't think of anyone right off hand. They were all kind of funny, and they all did funny stuff. Up there in Virginia City, those guys, now they weren't too much on the tramp miner side, but they were some strange folks, some of those guys. We had one guy that worked down there; they called him the "Ski Jumper." He was a Swedish guy, and, God, he wore glasses about an inch and a half thick. [laughter] On weekends there weren't too many tourists in Virginia City, but there were some coming through. His favorite trick was to get a whole bunch of nice little pieces of ore with a lot of pyrite and stuff in them. Then he would go up, and he would sit around the saloon, wait for some

tourist to come through. He would always manage to get them to talk about something. Then he would just happen to have a nice specimen of ore, and he would sell it to them. [laughter] He would sell them a little hunk of ore, you know, for a dollar or something, which was pretty good money back in those days, in the 1930s. Well, they would buy a little piece of ore from him, and they were genuine. Most of it was something he had got by picking a handful off of a car when he went home Saturday night or something, so he would have some. He used to sell them ore.

They had another guy who used to be quite a talker. He was known as "Popalation John." The reason you called him Popalation was that he never said "all the people," or "everybody;" it was always, "All the popalation." He roomed with me, when I was up there working at Milo Janovich's. Why, John was one of Milo's tenants or renters or roomers. Yes, he liked to get downtown and talk. He was quite a talker. At the least, that was his favorite word, "All the popalation."

There were a lot of strange guys, a lot of strange people. I don't know.

Did you miss mining once you got out of it?

Yes. I still miss it. I still like to look at rocks. If I'm out in the hills, I always go look at an old mine dump. I still like to go out in places around here where there's mine dumps. I like to go to Ramsey and Talapoosa and places where I can walk around and look at the rocks. Up on Peavine. Of course, you can't get up there on Peavine; that road is all shut off.

Oh, no, when you finally get out of it, you miss it for quite a while. I would love to have stayed in it, but there weren't any decent jobs, and I just got too far along with the power company, and then I got like a squatter. I didn't want to leave.

Once they opened up again, you would've been interested in the jobs that opened over in the Carlin Trend, and so on?

Well, I'd have been out of mining a long time before that happened, anyway. It was quite a few years before those jobs were available. Then they had plenty of people, anyway. I was truly kind of happy with where I was.



Well, the only thing we might run over is the automatic drills, when they first came in—the different kinds they had and stuff.

Were you around when the automatic drills started?

Oh, sure. I never saw anything in my day, but they came in in the late 1800s. Of course, up to that time it was all single jack and double jack. The first machines that were used in this area were in the latter days of the Sutro Tunnel. They got some big drifters in there, liners. They were called Burleighs. They were huge, big machines, and they ran on air. They were a piston, like a hammer machine, but these darn machines weighed about four hundred pounds. They had about a four or five-inch stroke, and they would ram, just drive the bit in. Then on the return stroke, it would ratchet, and it would turn it a little bit just like the guys did with their hand, but it was merely a pounding thing. They used those for a while. Later, this kind of took off, and they started building.

There were a lot of people, Ingersoll Rand, Gardner-Denver, a lot of them from those early years. They were building before the turn of the century. They were building piston machines, liners, and jack-hammers. They were all the same thing,

though. They just pounded, and then they ratcheted. They were dry machines, not like the later ones where you had water running through a hole in the middle of the steel. I guess it was around the 1890s when they decided to make a machine to drill overhead. They came up with a stopper.

The first one that came out was the one called the Waugh stopper. Dry machine. They used a steel that's called cruciform steel, which looked like a four-leaf clover. When that fit in the chuck, it wasn't going to rotate. That was a real way of keeping that steel. They had a stinger on the end, an air piston that pushed them up as you drilled, but they didn't rotate; they just pounded. They had a handle out on them, and the guy used to stand there and swing it back and forth. They called them wiggle tails. That was one of the names, and then they got a more ominous name a little later on. They were called widow makers. They were dry machines. In Tonopah and places like that, where they had highly silicious ores, they came in just about the turn of the century. Tonopah was full of them. Another camp down there in southern Nevada called Dalamar was a highly silicious camp. Those miners—if they lasted a year in those mines with those damned things, you know. Finally, somebody got tired of that, and they figured out how to make them rotate. Also, you could run water through there and wash the stuff out and cut the dust down and keep your hole cleaner.

The stoppers, actually, never did change shape. They always looked the same. They always had that handle, they always had the stinger, but they rotated. Then, of course, all the machines started using water and rotating. You could drill dry with them if you wanted to. Like sometimes with a jackhammer outside, they would drill dry, but almost all of them had a water needle, where you could hook a water hose in them. Those old

drills were tough. Lots of those old drifters and liners and piston machines ended up in shops. They would mount them on a frame, and they had about a four-inch stroke; they would use them for little air hammers. They would just turn them on. They could use them to sharpen small picks and small tools. I imagine there's a lot of them laying around in junk heaps in many places now, but for years that was quite a thing, starting in the 1920s or so. Somebody decided to make a little air hammer, and so almost every mine shop you saw had one of those old piston miners, a little air hammer. God, they worked great. With the small tools you could add a little anvil under them, and, boy, you could turn them on, and they would bang away. You could move that around; it worked real neat. They loved to have those kinds of things.

We're talking about drills and how they went from the old, early, dry drills to wet drilling. What was around when you were working underground?

Well, there were rotators and wet. Although, there were still mines where you would see an old Waugh stopper around every once in a while, but not many. Most of them were pretty much all rotators, the drifters and liners, in those days. We had two types. Of course, they had the automatic feed, which would feed in on the shell. It would feed in as you drilled with air, or you could hand crank them, which was the old style on a screw. You would have to have a handle on the back, and you would crank the machine in as it drilled. They were mounted on different kinds of things, long shells.

A lot of this stuff was replaced by the jackleg. That was quite an innovation. That came during the time I started. Jacklegs came out, probably, in the early 1950s. The

first ones I saw they had over at Park City, Utah, in the United Park City Mine. God, they were a light-weight machine. They were small. The machine itself was rather small, and it had a leg on it, an air driven leg, which you could move all over. It was quite flexible. You could even turn them around and drill straight up if you wanted to, and you never had to change; if you were going to drill a seven-foot round, you put in a seven-foot piece of steel, and you just walked the machine. It was just the refined way of the old Mexican set up I told you about. All you would do then is just move this. You would turn off the air in the leg and move it forward, set it down, and start drilling again. Just like with the Mexican set up you had to hold the machine and boost the piece of steel forward, but, otherwise, it was the same thing. You always had a little pressure. If you would get these things adjusted, you had good drilling; they would just stand there and drill by themselves. The ground was homogeneous—nice and good drilling.

When I was in Arizona I drilled with two of them. Once one is started, then start the other one. My partner then would go over and load the round we had drilled before. I would take the two machines and drill until he got done. Then he would come back. You could run, and that ground was excellent drilling. Once you got them started and got the feed right on the leg and everything going, hell, you could just stand there. They would just move in, and you would have to move the leg up, maybe. That's about all you would have to do. You could stand and have one drill on each side of you. They were a great innovation. One guy could pick one up and pack it around. They weren't that heavy. The machine itself was small, and the legs were generally made of aluminum. The legs didn't need to be much to push that machine in there. It didn't have to have that great, massive force on it, so a nice aluminum leg with a little piston plunger in it would work fine. You turned a little air in it.

You had a little handle on that where you turned the air into the leg, and then another handle ran the machine. Then your water hose went in there, too. It was a great thing. In a drift you could put two guys in there with a couple of jacklegs, and hell, they would be all done and off and away while the old method is setting up a goddamn bar and arm or something and fooling around and cranking it in.

The jumbos were used underground sometimes, though. They were large machines with a long shell. They were on a little cart, and you would run them right up. You would just jack screw them down so they were set. A lot of them would have two machines on them. Of course, it's pretty hard to beat those big machines, but they were larger. Jacklegs were cheaper, and they were more flexible. When I was in Arizona we were on this, walking out. We were on contract. My partner and I would drill three rounds a day, seven-foot holes, about twenty holes a round. We'd drill and blast three faces in a shift. Three of us on a crew, we had about four faces in, blocking out this big ore body. We had the two of us drilling, and we had another guy for the mucking machine, and he was mucking in this face, while we were drilling over here.

We had three shifts in a twenty-four hour period. We had a trammer with a motorman, a little mancha trammer. He would muck out two or three drifts a day. We would blast three every shift; all the shifts would blast. We would blast one at noon while we were out eating lunch, and this was dumb, because you would go in there eating, but we were getting paid by the foot. We would have one pretty near drilled out. We would finish that one, and then we would go into this one, and then, when we were just about going to get done, why, my partner would go load the one, and I would drill. Then he would come back; we would finish this one; we would load it. It was all electric. Then we would blast two when we went off shift.

The other crew was the same. We had five or six headings. We had plenty of places to go. It didn't make any difference to them. Whichever one was cleaned out, that was the one you went and drilled in. Whichever one had a muck pile in, that's the one you went and mucked. [laughter] The company didn't care. We made a lot of money at that though.



Explain gypo.

Gypo? That was contracting. The mines used to do that a lot. Like in a drift or a cross-cut, they would pay you so much a foot. Say, if there was no timber in it, you would get six dollars a foot, or something, and if you had to timber it, then maybe that would go up to six dollars and a half or seven dollars a foot. This generally would be for a five by seven opening. If it was bigger, a larger drift, you got more. Same way with a raise, you would get paid so much a foot for that. In a stope they used to keep volumes, so you got paid by the cube, the cubic foot. They would measure the stope on a certain day and try to figure out how many cubic feet these miners did in this stope. They got paid a little extra per cubic foot.

On trammers sometimes they would pay them after fifty cars. They got fifty cents a car or something. At Bristol we had everybody on this, even the hoistmen. After he hoisted so many skips, we gave him so much a skip. Everybody down there made a little extra money, and that's why it worked so well. They gypoed quite a bit at Getchell and various other places. We never did do it at Newpark, because the president of the company didn't like it. At Copper Canyon each shift got a little bonus if they got so many everyday, like so many tons per shift. At the end of the month they'd build up a little bonus money. That was always one massive thing. Then they'd just divvy it up between

whoever was there. It was contracting. Of course, you were guaranteed your day's pay. Your contract was over and above.

A lot of them used to work seven days a week, so their total pay would be about seventy-five dollars for two weeks, because you were only getting four or five bucks a day. Then you had your gypo. Let's say the gypo came out at one hundred and ten dollars. Why, then you got your seventy-five dollars, but then you got the difference there, that was your gypo. You got thirty-five dollars in gypo.

Lots of times the guys had a little thing. They thought if they made their board and room they were happy—and maybe a dollar or two over. I worked a little gypo at Getchell for a while one summer with a guy, and we made almost ten dollars a day. The miners were getting five twenty-five. So we almost doubled our wages. But we worked hard. He was a young guy, and he was a pretty good miner. He was from Jordan Valley. He and I had this crosscut to run, and, God dang, we really hit hard. We made good money. We were big shots, making ten bucks a day, you know.

Was it kind of a source of pride or a source of competition?

In mining back in those days, back in the 1930s and 1940s and 1950s, it was competition, whether they were on gypo or not. Most of the big arguments that took place in the saloon in Battle Mountain were:

"I can drill more holes than you can drill."

"I can muck more muck than you can muck."

"I can do anything you can do, and I can do it better."

Then they would go out to show them that they could do it, too. Those guys had a lot of pride in their work. Some guy would go in to start telling about how he drilled such and such a number of holes up in the

stope and blasted something. Some other guy—he had done better than that—and they would get in an argument. Then they would make a bet. The next day you would go out and go up in the stope, and they would say, “Get out of here. I haven’t got time to talk to you. I’m busy.” They wouldn’t even stop to talk to you, so you would say OK. You would leave, then find out that they had a bet with a guy in the other stope over who was going to drill the most holes that day. Wasn’t anything in it for them, at all, not a nickel in it for them, but they wanted to do it.

The mucking crews at Copper Canyon had a bunch of young guys, and they just wanted to see if they could beat each other. I had a really dandy crew. There were three or four young guys that were from Eureka. They would come over there, work, and then they would drive home every Sunday and be back. One of them was Carl Herrera’s brother. I don’t know if you’ve heard of Carl Herrera. He’s a dentist here. Well, one of them was Carl’s brother. [laughter] I can’t remember his first name. It was this bunch of kids from Eureka, and, boy, I’d go in and tell them, “Well, the other guys got two hundred and five cars.”

And they would say, “They did?”

“Yes.” So we would get two hundred and fifteen.

Then, well, the other shifter would tell them, “Yes, those guys got two hundred and fifteen.” Then his crew would try to beat that. [laughter]

The only trouble we had with them was that we had to watch them and sometimes pull them out of the shrinkage stope. They would want to pull too much ore out of it. The miners would be too far from the back. You didn’t want to be more than about seven or eight feet from the back, because then you could see it, and you could bar down. That was just the right height to drill with your stoper. You could get the chuck right

up to the back and drill a full hole. They liked to compete, and it was just a matter of thinking they were better than the other guy. They were going to show him, you know. I’ve seen them just about get into fistfights over who could do this the best, or who could do something else better. They were quite competitive. It went on all the time. You would hear them arguing in the bunk. In the change room, sometimes, two of them would get in an argument, “Ha, ha, ha. Hear you didn’t get drilled out today!”

And the other ones, “Pshaw, you couldn’t have made it if you had a . . .”

They bragged more about what they did back then, whereas, nowadays most of the bragging is about how you goofed off on the job and got away with it. How you didn’t do any work at all, but you still got your dang pay for it. No, it was very few, in my experience, who were those guys. I don’t think I ever saw one. Some of them were a little older than others; some of them were young and inexperienced, but everybody worked. You got a day’s work for your money, I’ll tell you, out of those people. They did a day’s work, and they would be ashamed of themselves if they didn’t. Goofing off was something I never did see. That’s why you could leave these people alone. You never had to bother with them.

When I first went to Newpark I had about fifty-one guys. After making the rounds a few times I got to know them. I knew who I had to go and see and who I didn’t. All you knew was that they were pulling ten, fifteen cars of ore out of their chute everyday. You didn’t have to go bother them. Sometimes they would kind of feel a little bad if you didn’t come by. You would have to go visit them or they would feel that you didn’t like them anymore, or something.

But some of those guys you could have left alone forever. They knew just what they were doing, and they did their work. They didn’t go up and sleep just because the shift

boss didn't come in. Hell, I would have about twenty or thirty working places where you would spend your time at the ones where you were having some trouble with a timber, or you were having some trouble with the ground, or where you were trying to get something going and changing ore. These other fellows would just go down and go to work. That was all there was to it; nobody had to supervise them. There were quite a few of them. That's why you could have a big crew, because you didn't have to worry about them. At Copper Canyon, those guys were the same way. You never worried about them. Hell, they knew what to do. At Getchell, we were mining tungsten. Sometimes you would go up, and, hell, they would have a good idea. They would say, "Hey, you know, why don't we do this? Let's see."

I would say, "Why don't you try it, see if it works any better. If it works for you, go ahead and do it. As long as there is some ore coming out of the chute, we don't care how you do it. Don't endanger yourself, of course. Don't hurt yourself. Don't make the stope a dangerous place to work in, but other than that, why, do what you want." They had lots of good ideas.

They would be working, and they would be thinking about them. A lot of their ideas came from the fact that they had been in lots of other mines. Along the way they would pick up stuff that they thought was pretty neat, and they would come and tell you, "You know, over there at Coeur d'Alene they got a little way of doing such and such."

"What is it?"

"Just blah, blah, blah . . ."

"OK. You know how to do that?"

"Oh, yes."

Well, I'd say, "Why don't you try it, see how it works?" If it worked, then you got smarter, too. I got an awful lot of smart tramp miners coming through making suggestions or seeing them doing something and asking them about it.

"Oh, I learned to do this over there in Colorado," you know, or someplace like that.

"This is the way they do it down there in Bishop."

So you learned a lot after your college years?

Oh, you learn more then. That's when your learning process begins, the day you get out of school and go to work. Then you find out that all the theory doesn't apply, anyhow. The only thing you know is the technical stuff, and you do know where to go find it; you know what book it's in, but you could sit there and read a thousand books on going down underground mining, and it just won't mean a damn thing until you do it.

The type of rock you're working in. The type of ore. Is it hard? Is it soft? Does it cave? Is it flat? Is it plated? Is it whatever? What is it? What kind of an ore body have you got—a big massive ore body, a little fissure? Are there faults around here that you have to contend with? All kinds of things.

You get down there, and you find out that you have to figure out how many holes you have to drill to break a face in a drift. If you went by the book you'd probably be there for two or three weeks trying to figure it out. Experience there is the best thing. Go to drill a drift face. You know, most of them miners, they had a pretty good idea of what kind of rock it might be. Go in there, and you drill. They look at it. Say, it's fourteen holes, sixteen holes, sometimes only ten holes; sometimes twenty-eight holes, if it's really hard. When I was working up there for Julius, running some of those drifts for that ground, it was pretty cavey, some of it. We had to timber a lot of it, and we put sets in—every two and a half feet a set of timber to keep that thing from caving. I would only shoot enough for one set of timber; that would be about three feet, maybe a little over. In those

cavey things, all I ever drilled was three lifters and just shoot the bottom out of it. By the time we would get out there, the rest of it had darn near caved in. Then we would clean that out and get a set of timber in there in a hurry. Then I would just drill maybe three lifters, put about a stick and a half of powder in each one, just loosen up the bottom. Then the rest of it you didn't half to, because if you had shot it you'd break it out for miles around you. You would just encourage it to come. This way you didn't. Most of this would stay right there. It would be broken, and then this stuff here would just slowly break. Then when you went in you started cleaning it out.

Often we would have to pick the back down a little bit, but we were always ready to put a set of timber in, in a hurry. If we could get the set in and get the back lagging on, we had it knocked. We had places at Getchell in that foot wall, where that doggone stuff was so hard, we would have one miner go in and drill. He would drill a burn cut and then maybe four relievers and shoot that, and if that pulled, then the next miner would drill the rest of the round, but that drift would take about thirty-five holes. That was before the days of carbide bits and things like that, you know. You had those old steel bits—some guy sharpening them out in the blacksmith's shop. Well, the bits were as good as the sharpener. Sometimes, if you had a good blacksmith, your bits and your steel were good. If you didn't, the bits were either overtempered or undertempered. Either they were brittle, or they were soft. The same with your steel—it would shank and break, or it would be too soft. When they came in with these carbide bits and stuff, that helped quite a bit.

In Arizona we used what they call a knock-off bit. They were just with a steel stand and threads on the end of your drill steel. It was just slightly tapered. These little bits, we just took them and took a soft hammer and drove them into this thing. They

only cost about thirty-five, forty cents apiece, is all. You'd drill with them until they were worn out, and then you'd just take your hammer and knock them off and throw them away. I think those bits weren't very much. I'm sure they were less than fifty cents a piece. In that rock, we would probably get forty or fifty feet of drilling out of one of those bits. The cost for drilling a hole and the bit cost were practically negligible. They didn't need carbide drills. We used tungsten in Getchell, and we used them in Park City, too, but it was definitely harder rock. Those little knock-off bits just work great down there. It was really just a little, tiny, old thing, just a little, simple bit, but you'd generally get them in two or three sizes, because sometimes you'd have to follow. Maybe your bit would get kind of dull halfway in a hole, and by that time, this one was a little worn, so you couldn't get another one that size, so we generally had two or three sizes. It didn't make any difference which one you used, but just in case you had to follow in a hole, you didn't want to get jammed up in there, get in there three feet and have to drill over again or get your steel stuck. We did pretty good. I liked those bits. They drilled very well.

Did you do any open-pit mining?

Very little. The most I ever did was in 1948 when I worked for Bill Donovan. I was the whole open pit crew, except for the shovel and truck driver, and that was another guy. He did that. He'd come up, scoop up the ore and put it in the truck and haul it to the mill. I didn't like open pit mining. To me, that was like digging gravel or something. The underground business always appealed to me much more than open pit mining.

The big copper companies were about the only ones that did open pit mining, and they refined it in Bingham Canyon, Ely, down in Arizona and New Mexico, where the big copper mines operated. They were about

the biggest open-pit operators. Other people mined open pit on a smaller scale, like we had small open pits at Getchell for tungsten. They just broke a little ore, and they didn't take any planning like they would in one of those big pits where you have benches and berms, and you have to figure out grades for hauling and stuff like that. They were pretty simple.

I mined a little tungsten for John Heizer that way, too. I worked for him off and on, in between things. I drove some tunnel for him on a prospect out there in Lovelock for a while, and then I worked for Heizer at quite a tungsten mine just east of Brady's Hot Springs, which is just north of Fernley, about halfway to Lovelock. We had a little open pit at one property he had there called the Star. We hit a little grade of sheet tungsten ore there. It was about thirty feet wide, and we mined that time. It wouldn't be open pit, because we just mined it like a cut. I did that for him for a while, and one winter I had a couple of months with nothing to do, and I really did more things than I thought I did.

Another time, I went over there one summer, and I drove a tunnel for him on another tungsten mine up above the Nevada Mile Ranch, a little tungsten property called the Stormy Day, and we did a little prospect. Most of that stuff up there was not scheelite, though. It was what we call powellite. When you put the light on it, instead of being a blue-white like scheelite, it's a real beautiful canary yellow with fluorescence. Where scheelite is pure calcium tungstate, the

powellite has a little molybdenum in it. Then one summer out at Getchell, too, there were several places where there was powellite, but it was an acceptable thing, because it could be acid treated and made into tungstic acid. It wasn't a complicated thing. It's not as good as scheelite, mind you, because the scheelite is just about the cleanest of all possible tungsten ore, but this stuff, powellite, is much better than hubnerite and some of those dirty ores they mined in Korea. They had iron and stuff in them, and they were hard to treat, while scheelite is just a simple acid treatment on calcium tungstate, and you've got tungstic acid.

Now, you were working, really, during a time when gold had closed down.

New Park was pretty good, because, see, we had five metals there. We had copper, silver, lead, zinc, and gold, so we were in pretty good shape there. We tried to get our heads at about thirty-five dollars a ton. We didn't have a mill, and we shipped it down to U.S. Smelting. They had a concentrator down there in a place called Sugar House, south of Salt Lake City. We mined about 600 tons a day at New Park. They would get mad if the ore got too good, because the circuit was set up for that recovery. Especially, when the gold was good, that's when they'd get mad.

Well, I think we've covered all the questions I have. I really appreciate your work on this. You've done a good job.

ROBERT HORTON

VICTORIA FORD: *It is August 20, 1999, and my name is Victoria Ford. I'm here with Bob Horton in his home in Reno. Bob, I wanted to start talking to you a little bit about your family background, because you mentioned that your father was in mining.*

ROBERT HORTON: Yes. He began mining in Colorado in the late 1800s. He was born in Towanda, Pennsylvania, in 1869, but his family came out to Kansas in the 1870s or 1880s. He and his father were in on the Cherokee Strip Race in Oklahoma in 1893, and that's really the first activity I know of my father from some of my relatives in Ponca City, who made contact with my brother and I about ten years ago. We didn't know any of them before then.

The Cherokee Strip Race was a famous race, the race for land in Oklahoma. Oklahomans are called Sooners, because some of the people didn't wait for the starting gun and took off sooner. [laughter] My dad and his father located a ranch, which my grandfather then held for many years. I've been to the ranch house, but it's no longer in the

family and hasn't been for quite a few years. Then, my dad left home. Part of the family story was that he left home when he was fourteen years old, but that doesn't hold with being with his father in the Cherokee Strip Race, so life's a little confusing there. The age wouldn't have been right. So, he came to Colorado, and he and my uncle, his brother Fred, were lifelong companions. He had two other brothers. One of them stayed in the Oklahoma area. The other one went to Africa with Cecil Rhodes to help build railroads and stayed there all his life, raised a family there. Cecil Rhodes was the developer of South Africa, and the Rhodes Scholar scholarships are by Cecil Rhodes. He was deeply involved in the Boer War and started the diamond mining in South Africa.

Did you ever know that uncle?

That was Uncle George. No, he died. I can remember the telegram coming to the house in Reno somewhere around 1933 or 1934, telling my father that he had died. Two of his sons have visited in the United States. Both of them are dead now. One was an al-

coholic and drank himself to death. One was killed by an elephant, and an aunt went over Victoria Falls in a canoe, which was a bad thing to do.

So that brother and his part of the family sort of became disconnected then, because of travel?

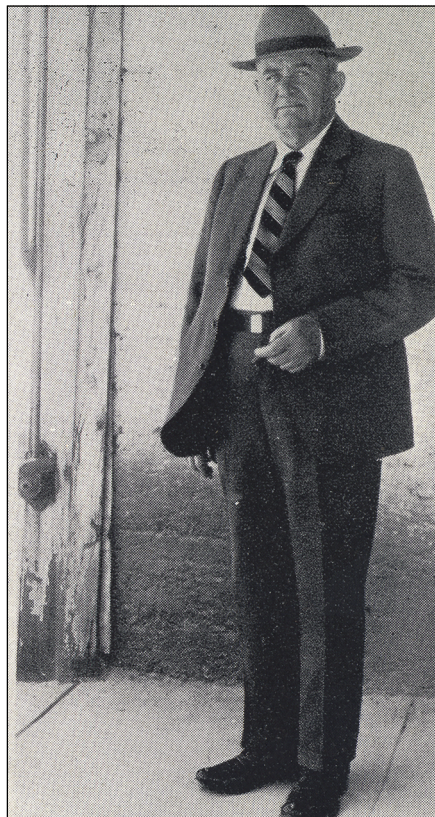
Yes. Correct. My Uncle Fred visited them and brought back some pictures—must have been before World War I. I have a suitcase from my uncle that he bought in London during that trip. The suitcase is heavier than anything you might put in it.

My dad and Uncle Fred went to Colorado and started mining. I don't have a lot of details, because my father died when I was fifteen. The summer before he died, he needed some help, and I spent my summer vacation in high school driving my father around. It was only then that we really started talking. Before you're fifteen or sixteen or seventeen, you're not interested in what your father did or whatever, and so I was just getting a little information, and would have some discussions with my Uncle Fred, later on, which gave me some history of my father's, but the details are rather scarce.

My father talked a couple of times about working all winter in a gold mine high in the Rocky Mountains with high-grade gold, which was wrapped up in ox hides and hauled across the snow down to the roads, where they could get a wagon in in the springtime and pick it up and haul it to a mill some place. He also admonished me that anytime you melt snow water for drinking, always put drill steel in it, so there's some iron in the water, because that's healthier for you. [laughter] That's a bit of his estate.

He must have made some money there, because he was preparing to go to South Africa to visit his brother when he met my

mother in Denver. Now, at that time he was thirty-seven; she was seventeen, and he was smitten. She had had rheumatic fever as a child and was in a wheelchair and was told that she would never be able to walk. Well, they got married in 1903, and he took her to a hot springs, perhaps Glenwood Hot Springs, which is a famous spa in Colorado, but I'm not positive of that. During that bit he threw away the wheelchair, and my mother was never in a wheelchair again, nor did she ever show any signs of rheumatic fever. [laughter] A miracle took place of some sort. My father was very strong-willed—that might have been the miracle. At that time they were living in Telluride, Colorado. He made his money in mining, gold mining, obviously, but from just what properties, I don't know. I have a little notebook of his from 1899 that mentions a few properties, but really no details.



Bob Horton's father, Frank Horton, Sr.

You said they wrapped the gold in ox hides to bring it down. What was the purpose of that?

Well, to slide it down across the snow without losing the ore. The country was too steep for sleds. They would have lost the sleds. They could roll the ox hides ahead of them down the snow.

Another thing that you mentioned was that your father was strong-willed. What examples can you give of that?

He ruled the family. He and my mother were very close, and my mother was a lady in the old-fashioned sense. My father was never in the kitchen. I have no picture of him ever washing dishes or drying dishes. Not particularly strong willed in that aspect, I guess. What he wanted to do, he did, and he did by himself. I don't know that he ever worked for anybody or was ever on a payroll. He probably would not have worked well.

He was a man of very strong principles. One of the family stories was that my mother and he went to an opera in Oakland at one time. At the intermission they were out in the lobby, and a baby had been crying off and on during the opera, which upset my father—and the rest of the audience, I presume. When they got out in the lobby, the baby was crying, and the father of the baby slapped the baby, and my father knocked him to the ground. My father was likely to react in that fashion. He was not tall. He was about five foot eight, but very strong.

You want another family story? A man was putting up the American flag in front of the civic center in Oakland. My father was walking by, and he let the flag touch the ground, and again my father knocked him to the ground. [laughter] He was very patriotic.

And had a physical solution to some things.

Yes, he did. He never touched me. He would speak to us. My twin brother and I would much rather he had spanked us, because his "talking to" was much worse than being spanked and turned loose, but he never touched us.

Tell me what you know of his work there in Telluride, Colorado. You say he must have made some money from gold there?

Well, yes, because he came to Nevada with enough money to buy a mine and stay in business. I have absolutely no details about it, at all. The only thing I know that's certain about Telluride was that in his wallet he had a card that noted he was a lifetime member of the Shrine in Telluride, Colorado.

Do you know any other stories of the Telluride time?

There was various entertainment from time to time, and one of the principal ones in all mining camps at that time was foot races, and people would bet on the foot race. My father fancied himself a pretty good foot racer. My uncle told me he was the second best foot racer in Colorado. At every race, he was the second best foot racer in Colorado.

Then, another story that was one of the highlights of Telluride was when they got the first fire hydrant in town. In all mining camps fire was a great concern. Lots of mining camps burned to the ground. They had put in a pipeline and had the fire hydrant. Now, fire hydrants are very large and very heavy. Most of the fire hydrant is below ground. They had it laying out in the street to be put in the next day. For a joke, my father picked it up and hid it behind a local saloon, and nobody could believe it, because they

couldn't believe that a person could pick up that fire hydrant. [laughter] But he was quite strong. Those are the major stories I know about Telluride. It's a beautiful town. I've been there several times—high in the Rockies, lots of snow, lots of mining around it. It's now a tourist haven. There are huge homes, that sort of thing. You couldn't mine there now, if you wanted to. [laughter]

So, your dad came from Colorado to Nevada, and where in Nevada?

Well, lots of people in Nevada came from Telluride, Colorado. There was a tremendous labor strike in Telluride in the late 1800s, early 1900s, with murders and shootings and bombings; and people, including my father and mother, left Telluride, and many of them came to Goldfield, Nevada, which had been discovered about that same time. I don't know any of the details. He acquired the Diamondfield Daisy Mine, which he developed. I have been to the mine. It doesn't

show any signs of great development. My father died long before I became a geologist or did any formal mining, so I might have talked to him about the mine or something like that, but I know no details of it at all, and there's nothing in the literature about it, which is strange in that my father sold it for somewhere between a quarter of a million and a million dollars in around 1906. So it had to have some values, but there's very little in the way of records of any production from it.

Can you find the records of his ownership and sale?

No, I have not. I've thought of going to Goldfield and looking for those, but I haven't done that as yet. He sold it and moved to Berkeley, California, and bought a very large home on Telegraph Avenue, which is right alongside the University of California, and bought a seat on the San Francisco Stock Exchange. They were there during the 1906



The "Stone House", built by Frank Horton Sr. at the Diamondfield Daisy Mine.

earthquake. Another house was being built alongside theirs in a vacant lot. The earthquake took place fairly early in the morning, and the shaking started to knock over lumber that was piled up to build this house next door. My father was certain that there were carpenters out there trying to go to work that early in the morning and making noise, so he went out to straighten out the carpenters and found the earth shaking. So, that was that. Oakland was not badly damaged, so they didn't have any problem.

Later on, he decided he wanted to go into the electrical distribution business for some reason, and so he began digging canals and building power lines in northern California and was fighting with PG&E and the state legislature over who was going to get the power franchise for northern California. Now, his money was not adequate for all that. He was always good at raising money, and there were investors in England that were supplying funds to build this utility, but World War I started—and poor England. That would have been about 1914 or 1915. English law prohibited money leaving England, and that was the end of the financing, and that was the end of the utility, and my father was essentially stone broke.

Another thing happened about that time. A brother who I never knew died from a faulty smallpox inoculation, as the family describes it. He was about five at the time, name of Orville. He was named for my grandfather. That probably had some impact on the family, but it wasn't until 1922, then, that they moved to Tonopah, Nevada, to go back into mining. That was his way of making money, was mining. He had, I suppose, many other ways to spend it, but that was his way of making money. That had been his life activity. He was in Colorado at least as early as 1884, so he'd been in mining for many, many years.

In 1922 he bought the Weepah Mine in Tonopah from a Mr. Darrow. Mr. Darrow had been taken to Weepah in about 1902 by some

Indians and had located the mining claims. Various people had looked at it, played with it. It's out in the middle of nowhere. There's a postcard that used to be common in Nevada that said, "Fifty miles from water, forty miles from wood, ten feet from hell. God Bless our home." That was Weepah, Nevada. [laughter]

It would sometimes be more than a year, and it would not rain there. More often than not, it was a year or a year and a half. The storms simply split before they got to Weepah. Very, very dry area. Weepah is northeast of Silver Peak—as the crow flies—probably ten miles, fifteen miles. Almost due west of Tonopah. The family lived in Tonopah, but there were houses in Weepah, a boarding house for the miners. He was sinking a shaft and developing the mine.

Was he still owner of that, then, when you and your brother were born?

Yes. It wasn't producing; he was still developing it. He had formed a stock company, and was selling stock, and that was supporting the mine as he developed it. Then in March of 1927 my brother and Leonard Traynor were at the mine. They had walked down from the shaft towards the bunkhouse, and, as my brother tells it, stopped to sit near the path and smoke their pipes. Now, they were both about seventeen or eighteen years of age at that time. My brother stuck his hand in a badger hole—just fiddling as one does when you're sitting on the ground—and brought it out and was shaking it and noticed it was full of gold. They filled a can full of the dirt with the gold in it, took it into Tonopah and had it assayed, and it assayed quite high. The figure is still argued about, but the newspapers reported it anywhere from \$4,000 to \$14,000 a ton. The assayer let the word out, and my brother, probably, as a young man, couldn't keep it a secret, either, and there was a great land rush then to Weepah. It was the last gold rush in the



Gallows frame on the Weepah Mine, which is one hundred feet higher than the badger hole where Horton's brother found high-grade ore.

West. Gold was twenty-two dollars an ounce at that time.

Anyway, it was very high grade. As a geologist, I know now how it occurred. People at that time, perhaps, didn't recognize it, but as gold veins weather and erode—and we'll imagine a hundred feet or two hundred feet, or maybe a thousand feet of erosion—the rock is carried away, and the gold being heavier, will stay right there and stay in the cracks and work its way down. I'm quite certain that that's exactly how that high-grade pocket was formed, because the gold was in loose dirt. It was referred to as the Badger Hole, and there were signs. Sacks were taken out of it.

The net result was lots of lawsuits, though. One was Leonard Traynor. My brother had a joint ownership of some old vehicle, and they wanted to go to Weepah on this particular day, and they only had three good tires, so an older gentleman made an arrangement to loan them an old tire,

which they used. Well, he claimed a 25 percent interest in the mine, since he'd put one tire on the car, [laughter] and there were other lawsuits that went on for years. My twin brother is an attorney and just mentioned the other day that he had reason to refer to a Nevada State Supreme Court decision on the Weepah case, because it set some precedent in law, of which I'm not familiar.

It was not a money raising thing. The excitement was rather relatively short-lived, and there are lots of publications and articles about it for anybody interested in going into depth, but it faded away, and then my father decided he would build a mill to mill the ore and try to get some income from the mine. There were two opportunities for a gold mill at that time, either a cyanide plant or a flotation. The flotation mill was quite a bit less expensive, so my father decided to build a flotation plant, which was a mistake, because the character of the ore was such that you could not get a good recovery using

flotation, so not much money, or any money, was made off of that. He was then approached through his attorney by some people from New York who wanted to lease the property, and he did subsequently lease the property to them. They built a cyanide plant and began open-pit mining. I think they were the first or second largest gold producer for a couple of years in Nevada, but remembering that there weren't any large gold mines at that time; most of the mines were quite small. This was by now 1935.

Is this information that you've researched since, or do you remember some of this from him telling you?

No, this is from him; this is family history. Some of that I have picked up through research I have done on Weepah. After he leased the mine he had some income from the royalty, and that's when he started looking around for other mines. At that time we were still living in Reno. He bought the Mari-gold Mine in Unionville, Nevada, which was an older mine and had operated in years past, owned by Salt Lake interests. He bought that sometime in 1936, and in spring of 1937 we moved to Unionville—there was a small home there—just to live for the summer was the theory. [laughter] It didn't work out that way. We stayed. My brother and I went to the school in Unionville for three years. We finished the sixth, seventh, and eighth grades there and received a splendid education. We had three different teachers each year. The school ranged from a low of five to a high of fourteen.

So, when your family moved to Unionville, was that your first experience in living in a mining camp?

Yes.

Let's start mixing some of your history in here. Where were you born?

In Tonopah in 1926. Sometime after March of 1927 and the Weepah discovery, we moved to Reno and lived in a home on West Sixth Street, which is still standing. One of my lifelong friends, Web Brown—his family lived in a small house immediately behind us. His father was Ernest Brown, who later became senator of Nevada for a brief time. When Pat McCarran died, he was appointed senator. He was district attorney of Reno during the 1930s, and there are many stories about his experiences with some of the mob-type people that came through Reno at that time.

Was your dad in Reno with the family, or was he going back and forth?

He went back and forth. He was home a small fraction of the time wherever we lived. He was usually at the mine, on the road, in Los Angeles raising money, in New York City raising money—probably not home more than twenty, thirty percent of the time.

Tell me, what was your first impression of Unionville?

Oh, it was a great place for boys, ten, eleven, twelve, thirteen years of age, particularly. Having a twin brother, I always had somebody to go climbing the mountains with, and there were two other boys out there about our same age, Neil Talcott and Frank Rhia. We camped out. We climbed mountains. We were gone all the time. Great fishing creeks. If we weren't going to school, we were going up a mountain some place. Lots of freedom, and no danger. Well, my mother didn't always know the cliffs that we climbed. [laughter] Some danger, but not much.

But completely different from living in town in Reno?

Yes, it was. Well, I don't recall being the least bit disappointed when the summer ended, and we did not return to Reno. We still had the home in Reno, a home that was rented, 719 Sierra Street. The freeway wiped it out. A big, two-story farmhouse in Reno. But we weren't disappointed at not going back. We'd made some friends and, I think, were looking forward to going to school there as a new experience. The house is still standing in Unionville, though it's scheduled to be torn down here very shortly. It's in very bad disrepair. I've been in it not too long ago, and I can't imagine how we fit in there. It's four little rooms with a lean-to on it. The lean-to was our bedroom. I don't think any room was bigger than twelve by twelve, and how we fit in there, I have no idea.

My oldest brother was Frank Horton Jr. He was the one I was referring to with Leonard Traynor. Frank was born in 1907. He was in mining or was a metallurgist all his life. He reached his maturity in Tonopah, Nevada, the family having moved there in 1922. In 1922 he would have been fourteen, fifteen years old, so he kind of went through his teenage years in Tonopah and moved with the family to Reno in 1927.

He attended the Mackay School of Mines at the University of Nevada for about two years during the Depression, married a young lady by the name of Phyllis Steinheimer. At that time her father owned the Studebaker agency in Reno. Her brother Milt was the manager for Eagle-Picher at Park Station for many years. They moved to Grass Valley, California, where he worked in various mills until 1938, when he took a job with Goldfields of South Africa at a mine in Venezuela. He went to Venezuela to work and was there a year or two when Phyllis, his wife, went to join him. As soon as she got there, he decided he wanted to come home, and they had banged around. That was

enough for Phyllis, and they were subsequently divorced. [laughter] But the family and the Steinheimers remained close friends for many years, and are still with the survivors. Connie Steinheimer would be Phyllis's niece. She's a municipal judge in Reno.

Well, I mentioned earlier, Orville Horton, who the family didn't talk much about, because he had died while they were living in Oakland. He must have been born around 1909 or 1910 and died around 1914 or 1915 from a faulty smallpox inoculation. Nobody gets smallpox inoculations any more, because smallpox is wiped out, but an infection of some sort got started. The family so distrusted inoculations and vaccinations that I did not receive any vaccinations or inoculations till I went in the navy. No one was going to put a needle in their boys' arms again.

It left a lasting scar. One reason my brother and I were born is my mother must have been suffering some depression from losing a child, which would be normal. The doctor advised her after a few years, maybe, they ought to have another child. So, that's the reason my brother and I were born. My sister Betty was born in 1913, and we came along thirteen years later, so it really was two families. The problem for my brother and I is that we ended up with two mothers. [laughter] Betty and our mom.

So it was five children, and the one boy died. Your twin is Richard?

Yes, Robert and Richard.

Your father went back and forth from Reno to Weepah and actually did the operation of the mine. It wasn't just an investment for him?

No. He was an active operator, directing operations. Always was active.

So, Unionville was a great place?

It was. And that's where I started my education in mining, a little bit, mainly in milling. There was a small, three-ton cyanide mill. My older brother was there for a while before he went to Venezuela. He would instruct me, as young as I was—eleven or twelve—in the cyanide operations, and I would help him run the cyanide plant. It was an old-style one and had a Fairbanks Morse two-cylinder, vertical diesel engine that sounded like an anti-aircraft gun going off, *kubang, kubang*. Huge cylinders. Ran a beltline, which you don't see anymore, but in old mills there were beltlines that extended down through the mill that turned everything that had to be turned.

The mine that my father had bought turned out to be not much of a mine, but there was a large pile of ore, very near to the mill, that had been placed there via a tramline from the Arizona Mine, which was on a hill high above Unionville, and which had been a very productive and famous mine during its lifetime. Some of the ore that was shipped from the tramline down to the bottom of the mountain during the Arizona Mine time was placed in oxcarts and hauled by oxcarts to Sacramento, California, where it was loaded on sailing vessels and went around the Horn to Swansea, Wales, where it was treated by the cyanide process, which at that time was a secret process developed by a family in Swansea, Wales, in the British Isles. That's where the cyanide process was discovered. Anyway, this old pile of ore was down there and on land held by my father, so that was processed through the mill. It was largely silver ore, and he made a living for the family, and some other additional money, I suppose, by processing that ore.

Did your Dad build the mill?

No, the mill was there.

Was it a custom mill? I mean, could anybody run their ore through?

No. Well, it could have been. There wasn't any other ore around. So it didn't do that. There was only the Marigold. The Arizona had been closed down for many years. My father owned the mill. It was part of the mine. Very old style. We milled that ore from the Arizona Mine for about three years. They couldn't find any ore at the Marigold. It had been mined out, what ore there was.

Did your father know that when he purchased it?

I never talked to him about it. I don't understand, really, why he bought it, where he thought he was going to get the ore. It seems rather strange that we bought a mine that didn't have any ore in it, but that's the way old-timers did it. They did not do the work that a modern mining company does, where due diligence is required, and one drills lots of drill holes and takes lots of samples and gets consultants in to advise you. In the olden days, a fellow went out and looked at a property and cut a couple of samples and said, "I'll take it," or "No, I won't take it." That's the way it happened in those days.

Well, they didn't have the drills that we have today. They didn't have the time. It was a hard thing to get out to a mine. So they were sold on very brief examinations. That was true worldwide.

There are grand stories of the old consultants that went to South America, for instance. Ira Joralamon is a famous consultant. In the late 1800s, early 1900s, they would take a ship down to South America, take a mule train in to look at a mine, do some sampling, come back, write the report up while they're coming back on the ship, and invest millions and millions of dollars in a rather brief examination. The huge copper mines of South America were developed in just that fashion—one man's good eye. [laughter]

So your Dad must have found something there that was of interest to him, but it just didn't work out.

Right. It was a beautiful place to live, for a Nevada mining camp. Most Nevada mining camps, you know, are in the middle of nowhere with no water, no rain, or anything. Unionville is a beautiful canyon with poplar trees and orchards and green meadows and a nice trout stream.

About how many people live there?

There were about thirty-five when we were there.

Small, but they had their own school?

There's a picture of it over here. [laughter]

Describe for me what that school was like when you were attending it.

It was a one-room schoolhouse, had a large pot-bellied stove in the center of the room. There was no electricity, no running water. In back of the school was an outhouse for the girls and an outhouse for the boys and a shed that held the wood and coal for the pot-bellied stove. Neil Talcott got one dollar a month for bringing water to school each day, so we would have drinking water. My brother and I each got a dollar a month for sweeping the school out and for bringing in the wood and coal and keeping the fire going in the pot-bellied stove. We had three different teachers, all of them expert teachers. I'm fond of saying, largely with full truth, that I was in high school for two years before I was taught anything I hadn't learned in grammar school, because the teachers would give you just as much, and a little bit more than you could swallow. So my brother and I were fortunate in that bit.

It was a mile to the school, and we usually walked, and I'm fond of telling my daughters that it was a mile through three foot of snow, uphill both ways, to school. [laughter] But it wasn't a bad hike. I have lots of memories of the school. The threshold of the back door was deeply worn, and there was a good inch, inch and a half between the door and the threshold, and when it would snow, snow would blow in across the floor. When you had nothing else to do, you could bet on how close the snow would get to the stove before it melted. A bad storm was when the snow swept under the stove. [laughter] But it was good living.

There were two front doors. In the olden days, one was the girls', and one was the boys' entrance. There was a little ante room where you could hang up your coats and leave your galoshes lie around, but one door was all we used during my time; maybe it was easier to keep clean.

So, they had stopped segregating the boys and girls in that way.

I'm sure it was a challenge for the teacher. Sometimes we would have people in the first grade, and my brother and I might have been in the eighth grade, and there would be people in the third and the sixth, seventh, or fifth grade. The teacher had quite a challenge to change her mind set as she instructed the different ones, and, of course, you heard the instruction that was given to everybody else, so you got third grade instruction, even though you might have been in the eighth grade—although you were supposed to be studying at that time. There wasn't much else to do, so you did study. [laughter]

At night we studied. The family belonged to the book club of the month at that time, and there wasn't much to do in the evening. We did have an electric Kohler plant that normally gave us power—though sometimes

it was kerosene lights—and a radio, but very poor reception, so everybody in the family read. My brother and I pored through lots of books, to our advantage, because there was nothing else to do. I suppose if we'd had TV, we'd have been as bad as the kids today, but we didn't have TV. [laughter]

How does this compare to the school that you left in Reno?

It was a good school, too. We went to McKinley Park. They are now preserving it, I'm sure, in my name. [laughter] There were splendid teachers there, too. I'm old enough to remember that teachers had to be single, you know, never see a man, certainly; never go downtown, have a drink, or have any sort of social life, whatever.

Because that was back in the day where if a teacher who was a woman got married, then she could no longer be a teacher, correct?

She couldn't teach. Right. No, I remember most of my teachers. My kindergarten teacher was Miss Semenza, and the Semenza family was famous in Reno. First grade was Daisy Benjamin, a jewel of a lady.

Now, in terms of facilities, though, the McKinley Park School was different from what you encountered in Unionville?

Oh, yes. One room in McKinley Park was about the same size as the one-room schoolhouse in Unionville. It's quite a difference.

It doesn't sound like you were disappointed in any way about staying in Unionville.

No, and until we started talking, I had never thought about that. Was I disappointed that we didn't come back to Reno? Was I disappointed about school? No, we weren't.

We were pleased that we were staying in Unionville. I'm sure my mother was disappointed, because there was nothing for her to do, and she had been quite active in Reno in bridge circles and the Twentieth Century Club and others, and here she was, essentially, isolated in Unionville, so she must have been disappointed, though I can't remember ever knowing that. Not my brother and I; our disappointment came when we left Unionville to go to high school.

We came down the road to Mill City, Nevada, hit Highway 40, and we knew we were going to turn left to go to Reno, where we would go back to see our friends, some of whom visited us in Unionville—so we hadn't lost our friends in Reno—but we didn't turn left; we turned right for Winnemucca! That was the first time my brother and I knew we weren't going to Reno. I don't know if it was the first time my mother knew or not, but, as I mentioned, my father was strong willed. [laughter] If they had arguments, and they must have had arguments, they were always out of our hearing. I never saw my mother and father argue about anything.

We moved to Winnemucca, because my father in 1939 had bought a mine near Battle Mountain, Nevada, south of the little spot in the road of Valmy, Nevada, and for lack of any other name he called it the Marigold Mine. The Marigold Number Two. That is why we moved to Winnemucca, so we could be close to that. Now, my father was home more when we were in Winnemucca than he had been before, because the mine was a two-hour drive at the most, as opposed to Weepah, which was a full day's drive from Reno, or even more. When we drove to Weepah, I can remember in the 1930s, we would drive from Reno to Fallon, and then it was a graveled road from Fallon. We'd stay overnight at the Walker Lake Lodge, near Hawthorne, and then go on into Weepah, because it was very slow traffic, but we're in

modern times now, 1940, and we're in Winnemucca, Nevada, and going to high school.

It was the luckiest move for my brother and me—well, the second luckiest move, maybe. Unionville was a good one. Winnemucca was even a better one. Although the Reno High School was not large at that time—there was only one high school in Reno—it was much larger than the one in Winnemucca, and we made friends and had activities in Winnemucca that we would never have enjoyed in Reno. You could be in anything you wanted, you know. I was in drama, debate, track, basketball, whatever, band, all sorts of activities; plus, I had very close friends and still do to this day.

We're having our fifty-fifth reunion next weekend in Winnemucca, again, and we will not be together more than three seconds, and it will be just like a regular senior day in high school. Start off right where you left off. They're fantastic people. I have talked to other people about this particular relationship, and it extends from the classes in Winnemucca from 1940 through 1944, and we're close to all of those classes and all of the people. I don't know if it had to do with World War II, or what it is, but I have never met anybody in my wide tours of the world that has any relation that's similar to the Winnemucca High School relationships that continue to this day. There are quite a few that live in Reno now, but they're scattered around. They'll all be there. No one would miss the opportunity. We're not getting any younger. [laughter]

A few have passed away, but not too many. Most of them are accomplished. There are a few exceptions, but 80 percent of the boys are professional people, very unusual for a high school class like that, and the girls, too—most all the girls went to college, and during World War II they all became nurses. Very unusual. [laughter]

So it's difficult for you to say whether it was the small town, or whether it was the atmosphere of World War II.

Well, classes after us are not that close at all in Winnemucca. The high school is a lot larger, but even while it was the same size, during the late 1940s and into the 1950s, there weren't the relations that continued for us. I don't understand it, but I thoroughly enjoy it.



You said that your father died when you were young.

He died in January of 1942 from an aneurysm. Today, they would operate and put in a Dacron patch, but there was no such thing at that time. He had been in an automobile accident a couple years before then, and it was an aneurysm on the aorta. Whether that had anything to do with it or not, I don't know, but he'd enjoyed good health all his life. He'd never been in a hospital in his life until a few days before he died. It was a shock to us. Later, I wished that I had had a lot more discussions with my father, because I really don't know too much of the details of his background at all. What helped to kill him, I'm sure, was that World War II had started, and War Production Order L208 essentially made gold mining illegal. It was an effort to force miners to go to work in copper mines. Gold wasn't needed. Gold mining was ruled out, and my father had just completed a leaching arrangement—there were tanks that were designed for leaching—and had developed a lot of ore. It was an opportunity for him to make some money, finally, some good money, and he was refused the opportunity. I know that that disappointed him, didn't kill him.

The mine had been closed, and that summer of 1941, I drove him around the state, where he was trying to make some money, trying to sell a house or two in Weepah to be moved to Hawthorne. Hawthorne was literally exploding with the ammunition depot down there. The magnesite properties at Gabbs, Nevada, were being developed to supply the magnesium plant to be built in Henderson, Nevada. There was need for housing, and so he was down there looking for anything, any way to make a dollar. I know he didn't have much money, because we didn't stay in a motel. We both had sleeping bags, and we slept on the floor of a motel being built in Hawthorne by a friend of his from Tonopah, Ben Farrington. [laughter] He and I learned more of each other then, than any time. My brother didn't have that opportunity; he was in Winnemucca.

So we both worked all the way through high school, helped make the family buck, because when he died there wasn't any money. I think my sister had a twenty-dollar bill, and my mother had a ten-dollar bill. [laughter] That was about it. He had a Studebaker President car, and it was repossessed the day before he died, so the family was in rather dire shape, but I didn't know that at the time. My sister had been working in Reno, and later Las Vegas, and she moved to Winnemucca and essentially was the breadwinner for the family while we were going through high school. She was with the old age assistance in Winnemucca. It's a state program to take care of elderly people. I don't think it any longer exists. Medicare and some of the others have displaced it, I'm sure.

My brother and I both worked—my brother more than I. My brother worked for John Fransway in a service station, tire facility, there. John Fransway later was a state assemblyman, and there were two Fransway brothers in Winnemucca—two nice guys. My brother and the Fransways were quite close.

I, on the other hand, was in and out of jobs depending on what was going on in our high school. [laughter] I played basketball on the team, and I was on the track team, so I was in and out of jobs, but in later years I looked back on Winnemucca. Any place I went to ask for a job, I was hired. I never asked twice to get a job. I am absolutely positive that the businessmen of Winnemucca said to each other, "The Horton family is in really rough shape. They need whatever help we can give them. If they show up to be hired, hire them," or something like that, because I always got a job on a first inquiry, wherever I wanted. So I jerked sodas in the Eagle Drug; I worked in a hardware store; I worked in every service station in town. I worked in garages. I worked on the railroad. [laughter] I worked bailing hay. Any place I went for a job, I was hired. I'm absolutely positive that the Winnemucca businessmen were watching out for the Hortons. I've never heard that from anybody, but I know it has to be true.

That kind of community support for a family who lost their Dad.

Yes, but my brother and I didn't know we were in bad shape. We had clothes to wear, food to eat. I never suffered. We were like everybody else—no one had any money then in high school. There were a few wealthy kids, I guess, as I look back. Mostly girls, a couple of boys, whose fathers were wealthy ranchers, but I didn't know they were wealthy, and no one paid any attention to that.

There weren't the distinctions among the kids, at least, about whose family had the most money, but there were still a lot of families struggling about money following the Depression era?

Oh, the Depression was still going on, yes. World War II ultimately ended the depression, but it was still going on well into the war years, and for Nevada during the Depression, mining helped support families. Then when the war order shut down gold mining, it kind of changed for some families. Roosevelt raised the price of gold from twenty-two to thirty-five dollars an ounce, and that gave a surge for gold mining in Nevada. When World War II started, the gold mining went down the tubes, but other mining became more important. Gabbs, I mentioned, had the magnesite there, but tungsten mining became important. There was only the one tungsten mine in Nevada, Nevada Massachusetts, not too far from Unionville.

The portable black light, ultraviolet light was developed and put on the market just about the start of World War II for the U.S. The principal mineral of tungsten is scheelite, and that fluoresces under ultraviolet light a brilliant blue white. With the ultraviolet light, people could go out and find scheelite, because it's very difficult to see by eye. It looks a lot like quartz. Scheelite mines began to start up. Mercury mines were scattered throughout Nevada. The copper mining was going better. So mining did pick up.

My dad had purchased a portable ultraviolet light, and I wondered why. I was interested in mining at that time. I would go out to the mine with my Dad to Valmy and was interested in what was going on. I didn't ever work out there, but I was interested in what he was doing. I was building up my mining career even then, I guess. My twin brother wasn't the least bit interested; he was absolutely certain he didn't want to have anything to do with mining. Why? I've never asked him why he felt that way, but it was obvious, while on the other hand, I was interested in the mining bit and knew I was always going to be in mining.

There was a period of time after your father passed away, where your family wasn't really involved in mining, is that right?

Yes, but Winnemucca was involved in mining. There was mining all the way around it—mercury mines, tungsten mines. One of my acquaintances was a gentleman who was sent there by the U.S. Bureau of Mines to help develop strategic materials. The government at that time was most interested in manganese mines, so he was working to develop some manganese mines. I've looked back and often wondered what he might have thought if he knew I ended up as Director of the Bureau of Mines. [laughter] He was a very well-educated man. I'm trying to remember his name, and it escapes me right now.



I don't have much from my father. My sister pretty well controlled whatever was inherited, and there wasn't very much, but a few things I have got. This structure is a gold balance that is used in assaying for gold, and it was the one that my father used at Weepah and later at Unionville and later at the Marigold Mine.

It's a very beautiful wood case with a balance inside of glass?

Well, it's an extremely delicate balance. If an ore contained, we'll say, oh, a tenth of an ounce of gold per ton of ore, you could take fourteen ounces of that, melt it down, recover the gold, and weigh the gold on that balance. So it's made for weighing very, very tiny amounts. On top of it is a notebook that I found in some of my father's things. I don't remember where I found it or how I found it. I've just had it for a long time. It's a little prospector's guide with some space for making notes from 1899, which my father had in Telluride, Colorado.

Does it include the mining laws?

Yes, how to locate claims, all the things that a prospector at that time needed to know.

It would qualify as a pocket calendar now, for example.

Even thinner. [laughter] Here's a picture of my father that was printed in the Reno newspaper by a gentleman that was doing lots of sketches at that time of businessmen around Nevada. His name was Lew Hymer. He has a display at the Nevada Historical Society right now. This is a photograph with his favorite horse, Brownie. My sister has told me that that is Brownie. I didn't ever know Brownie. My father is quite thin there. He later put on quite a bit of weight. He looks more like my uncle than my father, but that's my father at Weepah with his old horse Brownie. He'd go out there by buckboard—a long trip. [laughter] He's wearing a suit. He always wore a suit and a hat. In the summertime he wore a straw hat—straw boater—always. He was always dressed to the nines and had a tailor in San Francisco. All his clothes were tailor made. Even when the family didn't have any money, his clothes were tailor made. The University of Nevada now gets several hundred thousand dollars a year, because my father had a tailor in San Francisco.

When he had the Marigold Mine, the tailor made lots of money in San Francisco, I guess, handling clothes, and had moved to Reno. He lived in a lovely home in Reno and invested in my father's mine. My father talked him into buying a section of land, a square mile of railroad land alongside of the Marigold Mine. The tailor died. His family—some of them died. The ownership of the property was passed from hand to hand. They got tired of paying the taxes on it, so they finally gifted it to the University of Ne-

vada. The University of Nevada has since then leased it to the mining company that operates Marigold Mine, and the royalty income gives several hundred thousand dollars a year to the University of Nevada. It's strange how things work out. [laughter]

It's interesting to see your father in a suit. You don't often think of a mining man in a suit everywhere he goes.

Always a suit. He had high-topped shoes, always polished, but he would go underground and cut samples in them. Whatever he was doing—taking out the garbage—he wore a suit. When he came home at night, he took off his suit coat, but not his tie. I never saw him without a tie. Very formal.

There's an old wallet of his from the Berkeley house days, a silver holder for a shaving stick, an aneroid barometer made in London that was always on his desk. He used it for keeping track of the weather, whether the air pressure was going up or down, but it's most convenient for measuring altitudes if you're out walking up and down mountains. Then there's a small pen knife that he must have had made in San Francisco, which is made with polished gold specimens from various mines—I don't know what mines. Then, a little, tiny dictionary which has been in the family forever. It's about an inch and a half long, an inch wide, and three-quarters of an inch deep, and it's a full dictionary. You have to have very good eyes to read it, but it's very convenient.

What about your father's education?

Well, he'd finished the fourth grade, but he was self educated. He wrote very well. He spoke very well. He thought very well. So he had done a lot of reading and educated himself. This wasn't unusual for people born in 1869. [laughter]

So, that's a very good connection to why he would carry that little pocket dictionary.

Yes, he wanted to be sure he had it when he was writing. Then he'd spell the words right, I'm sure. Next to that is his gold watch, which he carried forever.

Yes. It's kind of a little display that really captures his time—compared to today.

A shrine to him. [laughter] Well, in those days he was developing the Marigold Mine south of Valmy. Contrast that to today. He went there with several lengths of mine track, an ore car, a jackhammer for drilling holes, a one-ten compressor, which was a compressor capable of putting out a hundred and ten cubic foot of air. He had two miners that had worked with him in Unionville that came over. He started drilling and blasting, hauled the ore about four miles down to Valmy, loaded it on a railroad car, and shipped it to various smelters. He didn't have a permit from anybody for anything, nor did he need one. Today, you couldn't start that mine up until you had expended at least one million dollars for permits. That's how it's changed.

There must have been some real glory days when they sold the Diamondfield Daisy Mine.

Oh, there were.

The time in Oakland must have been wonderful.

Yes, until the money was all gone. [laughter] My parents went back to New York, and he walked into Tiffany's and laid down a blank check and told her to buy what she wanted, and she ended up with a lovely silver tea service and sterling silver tableware, all of which is still in the family, but there were complete sets of beautiful dishes—one

or two that were saved. When my father knew he was broke, with no more money out of England, my sister tells a story of him standing by the fireplace at the Berkeley house and picking up these lovely plates and throwing them angrily into the fireplace, shattering them. I think it's quite one thing to be poor, become rich, and then go poor again, as opposed to being born rich and going poor. When you've been poor, you know what it's like. [laughter]

I'm sure he was frustrated and perhaps kicking himself for not having managed his money better. My uncle used to tell me of trying to talk my father into buying some Standard Oil Stock in 1905. Could you imagine what that would be worth today? It would be about a hundred million dollars worth—but no, my father was self-sufficient, and I don't think he ever bought anybody else's stock. He invested it himself. Back then, sometimes it worked very well, and sometimes it didn't.

But by the time you were in Winnemucca, you were very interested in the mining?

Well, yes, as interested as a sixteen-year-old boy. I was also interested in girls and track and anything else, too, but when I was in high school I knew I was going to the Mackay School of Mines and be a miner.

So, you graduated in what year?

Well, they were a little round about it. I graduated in 1944, and my brother and I both had enlisted in the navy. We were going to be navy fighter pilots. Their various programs were numbered in those days. There was the V6 Program and the V5 Program. We were in the V5 Program. We had gone to California and enlisted. Twins were a little unique. We got substantial publicity. Our picture was in all the West Coast papers with a fellow swearing us in, because we were identical twins—tall, skinny kids.

We were required to go to college for one semester. So, I was working at the Cal-Neva Garage in Winnemucca when the postman came by and dropped off my orders. Why didn't he deliver them to the house? Well, he knew where I worked, and he knew I'd be interested, so he brought them there, and it was the orders. We were to go to Gonzaga University in Spokane, Washington. My brother got the same orders, so in late June we got on a train, went to Ogden, Utah—navy tickets—picked up some other fellows, ended up in a military cattle car—those were old cars with bunks built in them. We toured, went to Spokane, Washington, to Gonzaga University, where there were about 400 other sailors, similarly situated. There were five civilians going to school at the same time. We were in a dormitory, DeSmet Hall. DeSmet was a famous Jesuit priest that explored the Northwest in the early days. We started college at Gonzaga, which is a Jesuit school with highly educated people. We were lucky to go there. It was like being in a large fraternity.

The war was not going too bad. The Japanese weren't shooting down enough navy pilots at that time, fortunately, and so when the first semester ended, instead of going to flight school, we were sent for another semester, then another semester, and then another semester, and then the war ended, and I'm still at the University of Gonzaga. We were there long enough that when I walked down the street, and I passed some lady, I said, "Hello, Mrs. Jones."

"Hello, Bob." [laughter] We got to be old-timers in Spokane, Washington.

So, two years in college there?

Yes. Well, it was a year and a half, because we went continuously. You had to work hard. I had to study hard. It was unlike college today, in that we were free to leave the campus from about noon Saturday till six o'clock Sunday. Otherwise, we were re-

stricted to barracks or the campus. It was a very small campus, but that wasn't bad. It was a good time. I never got shot at, which was a good time.

You were there until 1946. Did you spend the your whole time in the navy there?

Almost. The war ended, and the navy was shrinking the troops and the educational programs, and we were all transferred to the University of Washington. My brother had been transferred there a semester earlier. So I went to the University of Washington. Early on in our navy days, my brother and I had talked about taking my mother as a partial dependent, which meant that the navy would send her a check as a partial dependent. I finally went over and did the paperwork, and I think they took twenty dollars a month out of my pay and put in forty dollars and sent her sixty dollars a month. My brother would give me ten dollars each month to balance it, so we're each giving ten dollars. Well, the war ends, and there was a point method for getting discharged. You got points for this and that, and I got five points for a partial dependent, and I'm looking at the paper one day, and I have enough points to get discharged. I went running to my brother, and I said, "Dick, Dick, Dick! I have enough points to get discharged!"

He said, "How's that?"

So, I explain it to him.

He said, "You dirty bastard! You'll pay me back every penny I ever gave you." [laughter] Because he had to stay in, but he stayed at the University of Washington. He didn't suffer too badly. The navy cut the program altogether, but they wanted some of those folks to stay in officer training, so they offered them a contract at forty dollars. They'd pay them forty dollars a month, if they would stay in the navy reserve, which my brother did. Life was hard for him, because he was getting forty dollars a month

from the navy; he was getting sixty-five dollars a month from the G.I. Bill, which paid all the fees at the university, and he and another boy from Nevada, George Tavernia, were houseboys at a sorority and lived in the basement and got forty-five dollars a month—board and room at that. They had money coming out their ears and no expenses. Well, they lived very well.

Me, partway through the semester, I was taking my first geology course and first mining courses at the University of Washington, and the people were idiots. I got so disgusted that I had enough points to finally get discharged, and I said, "I'm leaving here."

And the navy said, "Sign here."

So I did. Next thing I knew, I was on a train headed for Great Lakes Naval Training Station, boot camp out of Chicago, in January. This is not a good place to go in January.

Why were you going to boot camp?

I have no idea, but the navy thought I should go through boot camp, so I went through boot camp with enough points to get discharged, I'm sure, the only sailor to do so. [laughter] When I was on my way, I thought, well, this is another adventure, but after I had been there for a while, and we were in World War I barracks with the ice and snow blowing through, cold as all get out, as only Chicago can be—and this was north of Chicago—it was absolutely miserable. I finally got discharged and managed to get discharged in Chicago where I wanted to, because normally they would send you back to the West Coast, nearest your home to get discharged, but a buddy of mine, also from Gonzaga and University of Washington, had become a yeoman at the discharge center. He said, "Bob, we got to send you back to the West Coast, unless you have a car. You do have a car, don't you?"

And I said, "Yes, I do."

He said, "Fine. You can get discharged here." So I did.

Even though you did not have a car?

No. So I ended up with \$750 in my pocket from discharge pay and accumulated leave I hadn't had or something. So I hitchhiked back across country. Hit a little town I enjoyed, I'd stay a day or two, look around. Sun was shining all the way through. It stormed in front of me, stormed in back of me, but the sun shone on me every day, so that was a great time. I can remember skipping out with that discharge. Never have to listen to someone give me another order. It didn't work out that way, but . . . [laughter]

After you did your little travel across the United States, did you go straight into the university, here in Nevada?

No, I got out March 31. I got home middle of April and too late for the semester. So I went to work for the electric service company as an electrical apprentice. I worked on the Mapes as an electrician, as well as wiring houses. Later, I was a busboy in the Sky Room on opening night at the Mapes.

The Mapes is the Mapes Hotel and Casino here in Reno, where there is a big controversy now, whether to save the building or not save it. And you were there at the very beginning. You helped essentially build it, and then open it.

Then I started school that fall of 1946.

Did the G.I. Bill make the School of Mines possible for you? Or would you have been able to go on without it?

I'm certain I would have found a way to go to college, because I was going to college. Every kid I knew in high school in Winnemucca, of the seniors in our class, was going to college, so I would have found a way. I'd have been working or something, but the

G.I. Bill, like for millions of others, made it possible. Even though I benefitted from it, probably the best investment the United States ever made, the thing I didn't think about was that I could have gone to Stanford with the same expense, because you could go any place, and the G.I. Bill paid the expense. So, I was a nice guy. I chose one of the less expensive universities. I don't know if I'd have gotten into Stanford or not, but it never occurred to me. I was going to the Mackay School of Mines.

Well, one of the geology profs, who was a hero at that time, and still is a grand name in Nevada, somewhat more than most, was Prof Gianella, Vincent P. Gianella. He had been in Unionville and just stayed overnight with us one time, and I still remembered him, and I still wanted to go to it, and a friend of the family's was Jay Carpenter, who was director of the School of Mines at that time. So I had some reasons for wanting to go there.

How did they end up being friends of the family—because of your Dad?

Carpenter was in Tonopah. He came from there. He wasn't an educator all his life, at all. He was a mine superintendent in Tonopah. Well, I have to drop back a little bit. I had mentioned that Diamondfield Daisy Mine. Well, Jay Carpenter told me this story: A young boy came by one time, hustling a job. He was a recent graduate of MIT, and my Dad hired him, gave him his first job. That would have been 1906, 1905. In 1947 Kennecott Copper wanted to start a scholarship at the School of Mines, and they asked Jay Carpenter to send back a list of junior students who were worthy for scholarships, and they'd make the selection. So, he sent it back. John Kinnear was the president of Kennecott at that time, and he called up Jay Carpenter and said, "Is this Robert Horton the son of Frank Horton?"

Carpenter said, "Yes, he is."

"Give him the scholarship." And he was the young man my father had hired at Goldfield, Nevada. [laughter] I'd never met him. I had some correspondence thanking him for the scholarship. I did know his son, John Kinnear Jr., very well. He was later manager of the mine at Ely.

But John Kinnear Sr. remembered your Dad giving him that chance?

Yes. Bless his heart.

Tell me some of the things that you remember about Mackay School of Mines.

I remember many things. It was a thoroughly enjoyable time. The professors were exceptional, with one or two exceptions, particularly those at the School of Mines. They had been there for quite some time. There were two new professors hired while I was there, Alan Cree and Gordon Jacober, both in geology. They were good instructors. Alan Cree was a particularly exceptional professor. Their tenure was quite short, in that they didn't really fit in with the older professors, and the story that I heard was that Jay Carpenter had asked them to write a report on what they thought should be the future of the School of Mines. They worked long and hard on that report, gave it to Jay Carpenter, and the next day Alan Cree was in his office and saw the report in Jay's wastepaper basket. They both resigned at the end of the year.

Gordon Jacober went to work for Sun Oil Company in Denver, Colorado. Alan Cree became the foreign exploration specialist for City Service Oil Company. I kept in touch with Alan Cree through the years. He passed away about two years ago, but had a very interesting career. We remained friends, but I remained friends with all of the professors. They were all outstanding. They were very broad. We received a very diverse education. I would say that those who attended the

Mackay School of Mines at that time—and this was prior to the school having a graduate program—all received an education equivalent to a master's today, simply because we were the only students the professors had, and they laid as much on us as we could possibly absorb. [laughter]

That year, 1946, was the start of the G.I. rush back to school by reason of the G.I. Bill. By today's standards, the classes were small. Perhaps the largest class, Geology 101 or 102—beginning geology—might have had twenty-five or thirty people in it. Most of the classes were fifteen or smaller, so we received very personal instruction, and the professor knew you very, very well. [laughter]

Alan Cree and Jacober taught the summer field geology class in 1948. It was held near Contact, Nevada, at an agricultural station the university had, so we had two Quonset huts loaned to the School of Mines by the ag department. It was Knoll Creek experimental station. One of the students' wives was the cook. We studied and ate in one Quonset hut and lived in the other Quonset hut and had showers and quite nice facilities. Then a surprise came one time. We had some softballs and a bat, and so one weekend, "Let's play a little softball."

"Fine."

Alan Cree said, "Bob, you catch. I'll pitch."

Alan was a large man, but soft appearing, not anything to suggest an athlete of any kind. So I got down behind the plate with a very thin catcher's mitt on, and Alan wound up, threw the ball, and I went down on my fanny. As it turned out, he had been a professional softball pitcher, and he could throw that ball like a cannon ball—surprised all of us. No one ever hit a ball that Alan was pitching. You couldn't even see it. [laughter] It was interesting.

By contrast, in the summer camps later on Dick Larson was the leader, and Dick did not believe in having any water anywhere around the camp, so they camped in tents

miles away from the nearest creek or spring. I never understood his philosophy, but that's the way he ran his camp. No water, but just in Jeep cans, what you could carry. Nothing to take a bath in or wash your face or whatever. Yes, it was miserable. Fortunately, I didn't go to any of those camps. It has since changed. They now have a permanent camp at Ruth, Nevada, which is much better.

The other thing that strikes me is that you maintained friendships with many of your professors, then.

I did, particularly in the School of Mines. Now, we took classes elsewhere, chemistry classes and English. I don't think I took any English. A little philosophy, classes in the engineering department, but I wasn't close with any of those professors. There was a camaraderie within the School of Mines at that time, and I would say all of the students—most all of the students—remained close with the professors, and the professors stayed interested in them.

The other thing that the professors enjoyed that particular year was that they did not have to stimulate the students in order to get them to study. At twenty I was one of the youngest students, because most of them were all G.I.s coming back, as was I, but a lot of them were twenty-five, twenty-eight years old and deeply interested in their education. They were most anxious for any and all education they could get, so it was a unique time, and the professors used to speak of that afterwards, about how much they enjoyed that group, because they were so dedicated. They wanted to get their education over with and get out and make a dollar and put the war behind them, which they did.

The G.I. Bill made a big difference for a lot of them. There were students with me that could probably not have gone to college. They were married. Some had children, had come out of the war without anything

in the way of money; and life would have been pretty hard for them. So the student housing that then existed up above the university was called “Fertile Valley”—due to the many pregnancies that occurred. [laughter] It was about where the new stadium is, on a hill up there. Victory Village was its formal title. It was housing that had been there, I guess, for cadets that went to the university during the war. So that made it inexpensive housing.

I was interested enough in the total realm of mining. I looked at myself as wanting to be a well-rounded mining man, so I took all the courses in mining and in metallurgy, as well as in geology, so I got to know all the professors in all of those sciences.

It was possible to specialize, though, at that time?

Well, that was an extra year in order to do that. I graduated in geology, so I guess, if I had a specialty, it's geology, but I took all the mining and metallurgy courses. You couldn't do that today; there are a lot more diverse courses offered, but at that time it was quite possible. They taught basic metallurgy and basic mining techniques, and the mining and metallurgical techniques of that time were somewhat simpler, perhaps, than they are today.

Describe some of the mining and metallurgical techniques that you were studying at that time.

Gravity techniques recover minerals where the mineral that you wish to recover has to be much heavier, a higher specific gravity, than the waste rock, so you can separate it by different mechanical contrivances that make use of the difference in the specific gravity. There are concentrating tables, hydraulic jigs. The old placer mining techniques used that to recover gold—riffles, tables.

What is a hydraulic jig?

Hydraulic jig is a rather simple device. Think of a box with a screen near the top of it and lead shot on top of the screen. There's a piston in the side of it that goes back and forth. It's full of water, goes back and forth, and pulses the column of water. Then you run the crushed ore over the top of the lead shot. Now, the light material, like quartz or whatever, is not heavier than the lead shot, and it will not penetrate the bed of lead shot, but the gold is heavier than the lead shot, so it will go down through the lead shot, through the screen, and collect in the hutch of the jig. That's what a jig was. Some of them are still used today.

Then was flotation. Still used today. It makes use of the fact that some surfaces of valuable minerals do not become wet, but will adhere to bubbles. Various chemicals are used to emphasize this particular property. The bubbles in a tank, again, are caused by blowing air into it, or by mechanical means, and the air bubbles rise and collect the valuable mineral at the surface, and the bubbles overflow, carrying the valuable material with them. It's used mostly for sulfide ores. Copper mines and lead mines use flotation.

The other process would be cyanidation for recovery of gold and silver, where it's actually dissolved. And leaching techniques—well, cyanide is one of those, but oxide copper ores are also treated by leaching with sulfuric acid that dissolves the copper.

At this time, were there open pit mines and heap leaching going on, and you were studying some of these?

Well, heap leaching is a newer development. There wasn't any heap leaching at that time. The open pit mines had been going—copper from the late 1800s. So there were two principal copper mines in Nevada at that time—well, one at the time I was going to

school, and that would be Kennecott at Ely. Then in the middle 1950s Anaconda started the Anaconda Mine at Yerington. Those were the two main open pit mines.

Was there any gold mining going on that you were aware of at that time when you were in school?

Yes, there was one mine near Imlay, Nevada, (the name of it escapes me at the minute) a small gold operation, and there was some activity at Virginia City. While I was going to school, another student and I mapped underground in Virginia City in the New York shaft that Fred DeLongchamps owned at the time. We mapped the 800-foot level. It was a good choice, because in geology you had to have a field project in order to graduate, and most of the other students were mapping somewhere on Peavine Mountain. This was done during the winter months. We were mapping underground in Virginia City where it was eighty-five degrees and most comfortable. [laughter] It was a good move. I got to know Fred DeLongchamps through that and later on, yes.

What was your impression of him?

People often mistook him for my father—or my father was mistaken for Fred DeLongchamps. They looked a lot alike and were built the same, though my father was quite a bit older. Fred was a gentleman of the classical old school. I knew his work habits. He graduated, you know, from the School of Mines. He was a mining engineer, but became an architect—Nevada's most famous architect. He went to work at four o'clock in the morning to do his architecture work. This is when he's eighty years old—four o'clock in the morning. At nine o'clock the phone would start ringing, and he'd go from nine to three o'clock working with clients. Three or four o'clock, he'd go

home, have dinner, and go to bed, and get up at four o'clock the next morning and go to work. He died when he was about eighty-three or eighty-four or eighty-five—didn't get up one morning. As far as I know, he had enjoyed perfect health up till that time. He's just a very gentle person, but very ambitious, very hard working, obviously, and very intelligent. [laughter]

Well, yes, kind of a Renaissance man, if he can be an architect and a mining engineer.

He kept his hand in mining most of the time, always had something going on in mining. He owned the New York shaft and what was then called the Dayton Mill down at Goldhill.

So, your project was simply to map that shaft?

Yes. The student I was working with, Fred Whitford, had been a miner before the war. He was several years older than me. In order to get cooperation from the miners, the first thing we did was tell a couple of miners to sit down, and Fred and I drilled out the round and loaded it and shot it and mucked it into the car, while the miners took five—we had free run of the mine after that! [laughter]

Was it kind of that you had to prove yourself?

Yes. We both knew we had to do this, I guess, and Fred could do it. He had been the miner, and I knew enough about mining how to help him. Virginia City was unique at that time. There's the Delta Saloon, which is a major saloon in Virginia City now. At that time it was the Smokery Bar, and it was the last bar in the United States where a miner could walk in and set his lunch bucket on the bar, and the bartender would pour you a shot of whiskey and then ask you what you

wanted to drink. So after we'd get done with our work, we'd stop at the Smokery. The bartender would pour us a shot of whiskey. One of the fellows was a one-armed mucker. His arm was cut off just below the elbow, but if the one good arm ever got hold of you, you weren't going anywhere. He would come into the stools, "Buy the boys a drink." So, they'd pour us another shot, and we'd have another beer.

Then, the superintendent would come in, "Buy the kids a beer." I learned to drive down that Virginia City Highway in very bad condition—to get back to school on a Saturday. [laughter] We'd work on Saturday and Sundays, usually just Saturdays.

But you earned their respect by drilling that out and blasting?

By being a miner for them. [laughter] We were all right.

We've talked about gravity technologies, flotation, cyanidation, leaching. Were those the basics that you were studying at that time?

That was the basics, yes. At that time there wasn't a lot of metal mining or any kind of mining in Nevada, outside of Ruth, the copper mines. Most of the mining at that time was industrial minerals. It was industrial minerals: diatomite, silica—sand and gravel, of course, always—and gypsum for making wallboard. Metal mining was quite slow. Some mercury mining and tungsten mining. The Nevada Massachusetts Mine was still going near Imlay, Nevada, and there were small mercury operations scattered around the state.

The precious metals had not rebounded in 1946.

No, not after the war. Some of the ore bodies that had been worked prior to World

War II were perhaps still there, but the cost of operations had gone up. The price of gold was still thirty-five dollars, but the costs had doubled or tripled then. It just wasn't possible to mine gold and silver. The production at that time in the state was around a hundred to a hundred and twenty million dollars a year, gross value. Today, we're in the billions. [laughter]

Was that good production, though, for that time?

Oh, yes, it was.

With mining mostly in industrial materials, what were the job prospects at that time?

Well, there was still exploration going on, so a geologist was looking towards exploration, either in mining or in petroleum, but mostly mining. Two of the students I graduated with went into petroleum. The others went mostly into mining exploration or being a geologist at a mine site, and the miners found jobs, probably, some in Nevada, some in Utah, Idaho, Arizona, some overseas. They went to where the jobs were, and there weren't a whole lot in Nevada.

But there was enough around, and there was enough exploration that the job prospects looked good to you at that point?

I'd never thought of it in the way of jobs. I just was going to be in the mining business. If I'd have thought, I might have chosen something else. If you want to get rich, the mining business is not where you ought to go. [laughter]

Especialy, not right after World War II.

No. It didn't occur to me to do anything else.

Anything else about your time at Mackay School of Mines?

Well, there were several professors that remain dear to my heart. One was Bill Smythe, who was the chairman of the mining engineering department—a gentle person, too, an excellent professor. Another was Walter Palmer, who was always referred to as “Squeaky.” The Palmer Engineering Mines Building is named for his brother. He was a professor of civil engineering. Walter, Squeaky—can’t call him anything but Squeaky—had a high-pitched voice. He knew we called him Squeaky, and it didn’t bother him a bit. He taught metallurgy and also ran the mining laboratory, the Nevada Mining Analytical Laboratory.

The constitution of the state of Nevada requires that the president of the university shall analyze or cause to be analyzed ore submitted by the residents of the state. So the university established the Nevada Mining Analytical Laboratory, now merged with the Nevada Bureau of Mines, to do that.

At that time, and for many years afterwards, and many years prior to that, any resident of the state of Nevada could submit two gold and silver samples, and five of any other, each month for analysis. Walter was in charge of that work. He’d been at it long enough that it would be very unusual for somebody to bring in a sample that Walter could not tell them where it came from.

I was up there one day, and a fellow came in with a sample—and Walter had a little laugh, too—and Walter would say, “Hee, hee, hee, hee! You’ve been out prospecting north of Mina, Nevada, haven’t you?” [laughter] That’s where it came from. He just knew.

He was an amazing mineralogist, too, with hand identification of minerals, which is a skill unto itself. Gianella of the Geology Department was good at that, but Walter was even better. Somebody brought in some very strange-looking mineral; the two of them would get their heads together, and it

wouldn’t be long before they’d know what it was. [laughter]

So you felt like you had some excellent instructors and small classes, so that you got more than just a four-year education.

Yes, we did.

What happened after you graduated?

Well, I graduated in spring of 1949, and I went to work with the U.S. Geological Survey. Don White, a man famous in the Geological Survey, was then working at Steamboat Hot Springs and was also responsible for a mapping project of the Virginia City Quadrangle. I went to work for him. One day a week I took samples from the hot springs, measured temperatures and flow rates, brought the samples back to school where he had a little laboratory, so we could determine the conductivity and the chlorine content of it. Four days a week I worked mapping the Virginia City Quadrangle with a professor from Stanford. That was my first job. It didn’t last very long, [laughter] but that was started in June. In October that year the Stanford professor had gone back, and I was still doing a little work at Steamboat Hot Springs and doing a little mapping, but it had become very quiet and very dull, and for lack of anything else to do, I left and went to work as a teller for First National Bank.

Mostly, because it was pretty dull out there in the field?

Yes, and the salary wasn’t very good. I was getting \$125 a month. I went to work for the bank for \$170 dollars a month. That lasted until the spring of 1950. I’ve mentioned Fred Whitford. He and I had worked together at the New York shaft. We joined with Bob Madsen, who was a geology graduate who had worked one summer for Phillips Petroleum, to form a little company to do

oil and gas leasing in the state. The interest had *just* started. The three of us formed the United Engineers and started turning out oil and gas lease maps and doing leasing of lands for major companies and also for lots of people in Reno.

There are some interesting stories. I was in charge of handling the clients pretty much, and I didn't ever have to go out and solicit somebody. People were just interested in it. Lou Skinner was an attorney in town, and he was also the attorney for Harolds Club. He was in buying some leases and introduced me to a man named Keck, I think, (I'm not sure of that) who ran the keno in Harolds Club, and he wanted to do some leasing. Then Pappy Smith wanted to do some leasing, so pretty soon, well, I'm busy with Pappy Smith.

At that time Graham and McKay were two people running the Bank Club, and Graham got interested in it, and McKay. I did quite a bit of work for McKay. I can remember going out to his house one time. He wanted his wife to have a lease, so I had lease papers and drove out to his house. He lived south of town in a very nice home. I went into the home, and there must have been six coffee tables in this living room, and there was a .45 automatic sitting on each coffee table. He said, "Honey, would you come in here a minute?"

Now, McKay at that time was probably sixty-five or something, and a lady came in. It was the first time I had seen a buxom lady in a bikini. [laughter] It was hard to keep my mind on the lease, but we did get the leases signed.

Later on, he called up and said, "Bob, I've got two people visiting that would like to have some oil and gas leases in Nevada. Could we come over to your office?"

I said, "Well, come on over."

So they did, and he introduced me to these two people—didn't mean anything to me. They were from Florida, and we got talking about things in general, and we got to

talking about a little gaming in Nevada, and they mentioned they had gaming in Florida. Two days later the Kefauver hearings started, and he was looking at organized crime. The two men I had met were Meyer Lansky and his brother. [laughter] When he said, "We have gaming in Florida," he meant, "I've got gaming in Florida." [laughter] But nothing untowards happened, and it was a nice arrangement.

We made—for that time—quite a bit of money very rapidly. The oil and gas business slowed down, so we decided we'd lease a small mine in Arizona. We looked at several, and we leased a small lead mine in Arizona and started operating it.

I wanted to ask you about the oil and gas business. Was this a new thing to Nevada?

Almost new. There had been some oil and gas activity in Nevada, very sporadic. Some holes were drilled around Fallon. There were a couple of wells out there, produced a little bit of gas, probably from decomposing vegetation and recent sediments from Lake Lahontan—nothing of importance. There were some holes drilled near Las Vegas and one out near Mt. Hamilton in Nevada, with no success. I don't know why the interest was generated, but the Standard Oil and Continental drilled the first. It was Continental Meridian Number One Well (I remember that) in Newark Valley, east of Eureka. It was a dry hole. Other holes were drilled after that. There were tantalizing signs, oil, thick sections. Nevada has a tremendous thick section of sediments, up to 44,000 feet of Paleozoic sediments. There should be some oil some place. The down side is, with all the faulting and thrusting that's taken place in Nevada, the structural deformation may have destroyed the oil or ruined the traps. With that deformation there's no likelihood that you'll find large fields, like are found in Texas or Oklahoma, but nevertheless, people were drilling. There

were smells of oil, and you could find a little oil on the surface here and there, so the interest kept going hot and cold.

Well, it slowed down a little bit; then Shell Oil drilled a well in Railroad Valley. I was in the navy at that time at Moffett Field in late 1953 or 1954, and they hit oil—the first oil well in Nevada. There was a great burst of activity. My executive officer said, “Bob, I’ll fly you up to Reno.” [laughter] Because people were trying to find us. The business had folded.

I didn’t end up with the story of the mine in Arizona—but I’d gone in the navy, and my partners had gone elsewhere, and so there was no United Engineers, but all the people we’d done business for were anxious to get hold of us again. So my brother and my friend, Web Brown, started up the United Engineers business again with some lease maps and using the old material I had and making leases and did very well, got enough money for me that I was able to live for a year after I got out of the navy. [laughter]

Were you still a part of this business, even though you were in the navy?

Yes, and they were doing nice things for me. It was friendship—nothing formal. Well, what happened with the lead mine—the price of lead at that time was nineteen cents. In one week the price of lead went from nineteen cents to thirteen cents, and we had a cloudburst that flooded the mine and wiped out nine miles of road, and that pretty well brought that to an end. Mr. Whitford went elsewhere to do work. Bob Madsen stayed there, trying to operate the mine, and he and I divided our assets. He took the mine, and I took United Engineers back in Reno.

I had had some little health problems. I had gone to look at a mine in Mexico and had camped out in the desert a couple of nights and a few other places and got bit by

the wrong mosquito and came down with malaria. That took me a while to get rid of.

What was the treatment for malaria then?

We took quinine. Fortunately, it was a type of malaria that the quinine cured rather rapidly, though it leaves you weak for some time. I can sympathize with anybody who lives in the tropics and gets malaria now. Now, there are much more vicious varieties that you can’t hardly get rid of. It totally drains you. I was living in a hotel in the little town of Florence, Arizona. Had a brass bed. I’d come down from the mine, wasn’t feeling good up there, had a fever. My older brother was working for me. My partner’s wife, Dorothy, had been an army nurse, and she looked at me and said, “You get to bed.”

Well, I got to bed, and they went out to get a doctor, and I swear they were gone for three hours, but it was a half hour. Fevers do that to you. Your idea of time disappears. The doctor came and said, “Oh, I think he’s got flu.” He gave me some medicine for the flu, and I could see Dorothy did not believe him. She had seen lots of malaria in the army. Well, the next day I was fine. I had a forty-eight hour variety. Every forty-eight hours it comes back!

I was lying on the brass bed and was embarrassed with the noise it was making—I was shivering so badly that the bed was rattling. [laughter] They called another doctor, and he came over and said, “You’ve got malaria,” and gave me quinine, and that started the cure. And that’s still one of the problems, all right. In tropical countries, in particular, yes, you can get some bad things. Bad bugs.

After the lead mine and the malaria, what happened then?

Well, then I went back in the navy. The Korean War was going on then. I had men-

tioned earlier that I'd been at Gonzaga, and so the draft board decided that wasn't true service, though I'd gone and done what the navy had told me to do. [laughter] Had I stayed in the navy another two weeks, I would not have been drafted, but since I had not, they said they were going to draft me. Well, I was in the navy reserve, so I did go for a draft-board physical, and that was an experience in San Francisco. I called up the navy and said, "Hey, fellows, I'm coming back," and took a physical and a written examination in San Francisco to go to Officers Candidate School in Newport.

I don't know, military tests can be a little strange, but the written test, I guess, was supposed to take two hours, and I finished it in about thirty minutes and handed it in. Next thing I knew, I got a call to come up to this particular office and be interviewed by several commanders and a couple of captains: would I like to be an air intelligence officer? It wasn't unusual for geologists. A lot of air intelligence officers were geologists. That sounded like a good arrangement, so I became an air intelligence officer after I got out of Newport.

So, you were able to use some of your training with them?

Yes, the geology. Geologists are used to maps and directions and that sort of thing. Their intelligence officers do a lot of things. I ended up with a fighter-bomber squadron. You tell the pilots where to go and what to do, and when they come back, you try to find out where they've been and what they did. [laughter]

So did you go to Korea?

No. Well, I went to OCS, where, I'm proud to tell you, I graduated eighth in a class of one thousand. [laughter] Then to Jacksonville, Florida. Beverly was pregnant with

Robin at that time. We already had Debbie. Then to Washington D.C. for an air intelligence school, and then to Alameda, California for a Pacific Fleet air intelligence school, then to Moffett Field where I joined a VF152, which is a fighter bomber squadron. After some training there, we shipped out on the Yorktown.

At that time the Seventh Fleet was under MacArthur for general control, though run by the navy, but the navy wanted its own fleet, so the Yorktown and one destroyer became the First Fleet operating out of Manila Bay. We were in and out of Manila Bay, threatening the Chinese from time to time. They were bombing and shelling Quemoy and Matsu Islands, and every time they did, we'd go tearing out of Manila Bay and up through the Formosa Straits to wave the flag and tell them that wasn't a good thing to do. It was nine months, and I saw a lot of countries—Japan and Hong Kong, a lot of the Philippines—and was with a great group of guys. The ship was a good ship, so it was a fun time. There were times that weren't fun, but most of it was a good time. Guys weren't getting shot. We lost one pilot over there, one of my best friends, unfortunately, over the side. He came in for a landing with a single engine and dove in alongside the ship. But that and the seaman who fell overboard were the only people we lost. That was good.

Our squadron was half special weapons, atomic bomb delivery; and half night-all-weather intercept; so they flew at night. You can't possibly believe that a pilot can land a jet airplane on a carrier deck at night. Doing it in the daytime is almost impossible, but at night And they did it night after night after night in rain squalls and thunderstorms, big seas. [laughter] Yes. Amazing.

Anyway, I was sitting in Manila Bay, and I was getting copies of the *Engineering and Mining Journal* and some other publications, and all my friends were in Utah exploring for uranium. The uranium price

had gone up. Here I am sitting in Manila Bay, "I got to get out of the navy!" I picked up the BuPers, Bureau of Personnel, publication and started thumbing through it, and I'll never forget, it was paragraph 1926A, paragraph 5, category J that said: "If you had prior service in the navy, you were over twenty-five years of age when you received your commission, upon application, you could be released to inactive duty." The thing made no sense at all. Why would you have someone . . . ? It had to have been written by some congressman to fit his son or some admiral's son or somebody, but it fit me like a glove! [laughter]

It said, "upon application," so I hastily typed out a letter. In the military, you just don't send a letter to someone. It has to go through your commanding officer for his endorsement, so I gave it to my commanding officer. The nice thing about being in a squadron, it's like being in a family. Rank doesn't count very long. You know the rank is there, but good guys aren't waving the rank, so we were all friends. I gave it to the skipper. He looked at it and gave it to Jack Langley, the personnel officer. He says, "Check this out. Horton can't be right!" [laughter] But it was. We sent it in, and shortly after, I received a letter saying, "Mr. Horton will be released to inactive duty upon return of the ship to San Francisco," which I was.

I had been the oldest ensign in the Pacific Fleet, for having started my officer career late in life. [laughter] So I did get discharged and came back to Reno in April of 1955.

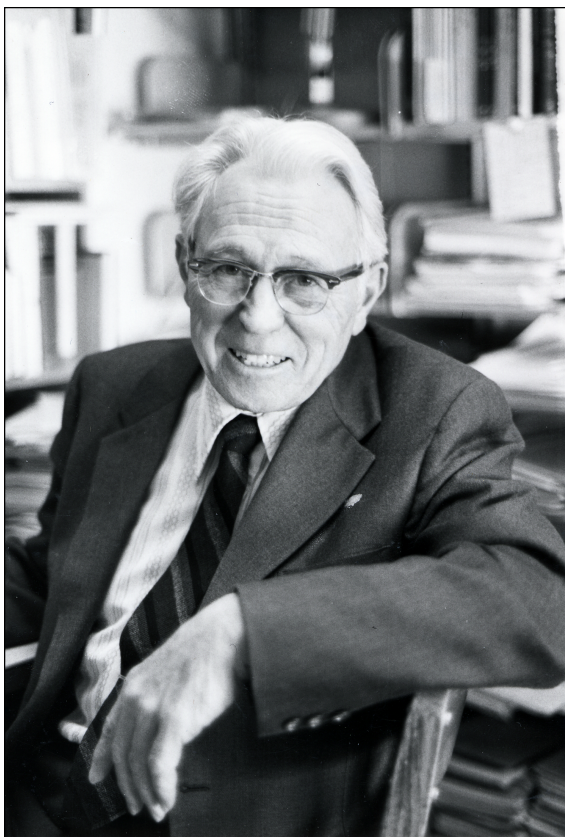
Uranium was a big thing in Utah by then. I started doing some consulting work and looking for uranium in Nevada—without luck. Nevada did not end up with much of any uranium. There were several small prospects. One mine south of Austin, Nevada, shipped several carloads, and there were a few other carloads shipped from here, but the production was extremely small. Nevada

just did not have the right geology for uranium.

I was looking around for a job, and living off the money that my brother and Web Brown had made for me in the oil business while I was absent. The oil business had since folded again. That was typical of the oil business. The peaks and valleys are even worse than the mining industry. There was an ad then in the mining engineering magazine, or *E&MJ, Engineering & Mining Journal*, for a mining engineer for the Nevada Bureau of Mines. I saw an advertisement for a mining engineer, and I wasn't a mining engineer; I was a geological engineer, but I mentioned I had taken all the mining courses. I didn't have much in the way of experience for such a position, but it looked very attractive, and so I filled out the application—I believe this was in September—and took it up to the university to Dean Scheid, who was the dean of the School of Mines and director of the Nevada Bureau of Mines. I knew Dean Scheid and still remained friends with some of the professors that were there, and had got to know some of the new ones, so I wasn't a stranger to them.

The Nevada Mining Association at that time was pushing a gentleman who lived in Fallon to be the mining engineer. The mining community in Nevada was very small at that time, and so they did have influence, but I think that the school did not really want to hire the man from Fallon. I don't know if they wanted to hire me or not, but anyway, the fellow from Fallon died before the decision was made. He was an older man. December 29 or 30, Dean Scheid called me up and said, "Would you like this job?"

"Lord, yes!" [laughter] So, I took the job and went to work. I was the second full-time employee. Victor Kral had been the first employee. In the 1930s the Nevada Bureau of Mines consisted largely just of some professors doing a little work in the summertime. It really had not much in the



Dean Vernon Scheid

way of any budget—a few hundred dollars, maybe, or a thousand dollars. Dean Scheid is the one that started to build it. In the summer of 1955 he had hired Ed Lawrence as geologist, and then I came on board January 1, 1956.

We wore lots of hats. We were also the Nevada Mining Analytical Laboratory. On Wednesdays and Thursdays we'd spend part of our time going through the samples that had been submitted by the prospectors, describing them. This was one of the requirements. I became an excellent mineralogist by all the practice that one had to do, though I've since lost that skill. [laughter] We would spend Fridays assaying the ore. Ed would do the fire assaying, and I'd do the wet chemistry on all the samples that had been submitted. Then others were hired, and it slowly grew to the rather substantial organization that it now is.

Sample analysis was one day a week, or two days a week. The other days were answering letters and questions from people within the state and without the state. Some of our worst times would come when some magazine would publish a story on mining. I can remember *True* magazine one time published an article on how to cross the United States and make your living while you are doing it and pay your expenses. The way you did that in Nevada was, "You pan for gold and silver in the many streams as you cross the state. For further details," it said, "write to the Nevada Bureau of Mines," and gave our address. [laughter] Thousands of letters poured in. We mimeographed a response—because we didn't have any Xeroxes in those days—and sent it out, "It's not quite that easy," was the gist of the letter. [laughter]

And we'd get others. Some of my favorites were when, once or twice a year, we'd get a letter that would say, "Please send me a map showing the location of all the lost mines in Nevada." Now, how does one have a map of all the lost mines, I don't know, but it seemed to be a reasonable request to the writer. [laughter] We had a form letter for that, too.

One of my jobs was to stay aware of all the mining activity of Nevada, and to do that, other than local contacts in the Reno area, I would make visits throughout the state. I had five or six trips mapped out that I would take once or twice a year that covered the state, on main highways, but also lots of branches. There was not a lot of mining activity at that time, so when I was going down a dirt road some place, following a track that went up a hill, I'd go up the hill to find out who was doing what up there and would run into some prospector or miner, and I became acquainted with all the prospectors and miners in Nevada, sometimes spent the evening with them—I'd stay overnight. It was an enjoyable time, and I learned the state of Nevada very, very well.

Do you remember some of those prospectors?

Oh, they were interesting. You have to be careful in Nevada. I stopped at one cabin one time and talked to a man and wife. They looked like they'd always lived in that cabin, probably didn't know much about the world, didn't get around much. Turns out, they had walked from Tierra del Fuego to El Paso, Texas—from the tip of South America to El Paso, Texas. [laughter] An *amazing* feat and accomplishment! They had traveled elsewhere in lots of the world. They knew the world upside down and backwards, and I learned from that one occasion to be very careful about what judgments you make on people. Yes, very careful. Met another one that looked like an old prospector—he had a Ph.D. from Stanford. Be careful. [laughter]

One of my better stories was when I was in northern Elko County, looking at some Tungsten prospects high up on a hillside. Coming down from that prospect, I was driving a Jeep that we'd got surplus from the air force at Stead, and it simply stopped. Engine stopped. I got out and looked, and the coil had slipped in its holder, got on top of the starter, which poked a hole in the coil, and it shorted out, so I didn't have any spark. So, I coasted as far as I could down the hill, till I came to the intersection of the main road in the valley, another graveled road. There was a ranch I could see about a quarter of a mile up the road—very fortunate. So I walked up to the ranch, and a fellow answered the door, and I explained my problem to him. He said, "Well, you need a coil." He says, "Let's go out in the barn and see if I might have one." We went out in the barn, and there was a timber that ran around the entire inside of the barn, up about six feet, and it was filled solidly with coils. He collected coils. [laughter] I picked up two or three, walked back to my Jeep, put one in.

The first one worked. [laughter] That's unbelievable!

And why would he collect coils?

Why would he? I don't know.

For people like you, who are broken down out there, I guess. [laughter]

It wasn't over yet. I went back to take the other coils to give back to him and thank him for it—he wouldn't accept any payment—and he said, "Come on in and have a cup of coffee." So, I went in and had a cup of coffee, and we were about halfway through the cup of coffee, and he looked at me and says, "Aren't you one of the Horton boys? Weren't you up here with your daddy in 1935?" And I *was* up there with my daddy in 1935. [laughter] Now, this was about 1960! How he knew I was one of the Horton boys, or how he recognized me—because we hadn't shared names as yet—but, "Aren't you one of the Horton boys that was up here with your daddy?" Unbelievable!

Well, you would have other adventures like that. Nevada is a small world.

It must have been even more so, then.

Oh, much smaller then, yes. The mining world was very small, too.

It's not only Nevada, but is there a community among miners?

Worldwide. Worldwide. That's been my experience traveling around the world. This may happen with other occupations, but it certainly happens with miners, "You're a miner, come on in. Can I buy you a drink?" [laughter] You're welcomed most any place.

And they remember you, once they know you, and there are relationships and friendships built on that?

Yes. Well, I did my best. I was a small consultant, so to speak, state-paid consultant for small miners. Most of their problems weren't very technical, but whether they had any ore or not, or how much, or where it might be, I was able to help them along that line. Most of it was, "You don't have anything. Give up," which they never did.

The miner is a total optimist. Miners would write to me and say, "Can somebody from the university come out?" Or after they got to know me, "Could Mr. Horton come out and look at my high-grade property?"

I learned fairly soon to ask them to send in a sample of their highest-grade ore, which I could then get assayed. Most of the time it didn't contain anything, and I was able to write back to them and say, "It doesn't have anything in it. There's not much point in my coming out," but if it ran something, then I would go out.

It was common that the fellow would be telling his friends, "Ah, we've got an expert from the university coming out tomorrow. He's just fascinated with what I have."

I'd go out there and look at it, and it would be a vein an eighth of an inch wide and three feet long, and that was it—nothing at all. So, I'd have to tell him that.

Well, then, the next day he was telling his friends, "Ah, this idiot from the university was out here, some young kid that didn't know anything," and back to work he'd go in his mine. [laughter]

You lost your expert status? [laughter]

Yes. Yes.

But that was primarily your work, a consultant to the small miners?

Well, that and doing some reports on the mineral resources of the state. Just the two of us at a time, and then other staff were added, but it was still small enough that we

were doing a little bit of everything. My main thrust, certainly, was public relations, mining company relations, which I enjoyed, and second would be writing reports. After we'd been there a couple of years, a chemist was hired to do the analytical work, and so I didn't have to do that anymore. I was able to do more mining relations.

Dean Scheid started the Pacific Mineral Industry Conferences, which was a series of conferences held in Reno, San Francisco, and Los Angeles—circulating around. He'd done the same thing in the Northwest when he was at the University of Idaho at Moscow. These were very successful conferences, and that was a fairly busy time for me, too, because when they were in Reno, we were very busy setting it up, and when they weren't in Reno, you still had quite a bit of work to do to help the other sections. It was sponsored under the AIME, American Institute of Metallurgical Engineers.

What was the point of these conferences?

Information exchange. Technical, scientific bit.

What specific information was new then that was being exchanged at these conferences?

Oh, a lot of it was descriptions of mining properties, which continue to this day. Geologists exchange that sort of information. Some mining techniques. What's new in marketing.

Was there anything new in mining techniques?

Well, block caving had been going on for a little while, but block caving and techniques for block caving was a subject of interest. It's a means of doing large-scale mining underground.

So you were starting to see more emphasis on large-scale mining, even though you were out working with the smaller mining operators.

Well, mainly, block caving for copper mining was in Arizona or Montana, not Nevada. There was some block caving at Ruth, Nevada, underground mining, but, no, the mining had not grown. Mining, instead, was shrinking in Nevada. I mentioned lots of tungsten mines. That was by reason of the government purchase program, which was paying an artificially high price. That program ended in 1956 or 1957. That pretty much was the end of the tungsten mining. Mercury mines were going, but with increased environmental concerns, the use of mercury was decreasing.

Steel-belted tires impacted mercury. Before steel-belted tires, most tires were made with rayon. To make rayon, you need sodium hydroxide. To get sodium hydroxide, you need large electrolytic cells, where the base of the cell is filled with mercury—3,000 flasks of mercury. Well, when they quit making rayon tires, they didn't need sodium hydroxide, and they didn't need the mercury, and that severely impacted mining. Strange how these things work back. [laughter]

Interesting. So, all of that was happening in the 1950s?

The 1950s and 1960s, yes.

Anything else that you can recall specifically that was a hot topic at those conferences?

Well, yes, Anaconda was developing a molybdenum mine north of Tonopah with drilling at that time. Jim Wilson was the chief geologist for Anaconda. Ken Jones worked with him. They were the only two corporate geologists in Reno at that time. The Ana-

conda was the only mining company that had an office in Reno. There are probably 500 geologists in Reno today, but there were only two at that time. The mine has gone through lots of ups and downs. It was finally opened as a molybdenum mine, closed, sold by Anaconda to Cypress, started up a little bit, closed. Most recently, a company has looked at it as a copper mine. There are some copper ores there, too, but at the moment, nothing is going on there.

Anaconda was also drilling for some molybdenum at the top end of Death Valley, which you can get to from near Lida, Nevada. The price of moly was looking good at that time, and it increased somewhat after that. Lots of people were interested in molybdenum, but the price took a sudden decline and has stayed low. Two reasons: lots of molybdenum is produced as a by-product of copper, and molybdenum is used largely in drill steel and in drill pipe for oil wells. With the decrease in exploration of oil, the molybdenum price went down.

So, mining overall was still shrinking in Nevada during this time when you were with the Bureau of Mines?

Yes, it was. Industrial minerals were becoming more and more important. Although their dollar volume wasn't huge, it was persistent.

But the Pacific Mineral Industry Conferences were successful? You had quite a bit of attendance at those?

Yes. They continued until well after I left the Nevada Bureau of Mines. I think I was out of the state when they died for lack of interest of anybody to carry them on. Had Dean Scheid still been at the university, I'm sure they would have continued, but it took somebody like that to maintain them.

How long did you have this job?

From 1956 until 1966.

Did you see any changes in the organization during that time?

Yes. Dean Scheid was able to convince the university and the legislature to increase the Bureau of Mines, which made sense. It was probably a hard sell, but it made sense—as important as mining was to Nevada—for the state to have some interest in it. It also supported the Mackay School of Mines and gave Scheid a greater base with which to educate students. Several of the people that worked for the Nevada Bureau of Mines were half time bureau and half time Mackay School of Mines. Plus, others—not myself—but others would give lectures from time to time, so it added to the quality of the School of Mines.

You had a bigger budget, more people on the staff? Because when you started, there were just the two of you.

Just two of us then, and there must be, I don't know, twenty or thirty now. Thirty people. About fifteen or so when I left. We were doing more and more publication works. We were pioneering some techniques in mapmaking for publications—a rather complicated process to turn out a colored map. We worked with a Washington, D.C. firm, William and Heintz. You ever see a beautiful colored map, chances are that down in the corner you'll see William and Heintz printed it. We worked with them to develop techniques. They printed many of our maps, but we did the color separation work.

Because this was pre-computer days, so this was all photography and color separations and that process?

Yes. Oh, no computer. Using masks. By that time we had a full-time editor and a

couple of draftsmen. Dean Scheid had made an agreement with the U.S. Geological Survey to do a study of every county in Nevada, to turn out a report on every county—with a couple of smaller ones being grouped together. This required an increased publication ability.

And it was in cooperation with the U.S.G.S.?

Yes. We gave them some money, and they also funded part of it to do this mapping program. Dean Scheid had great vision. Nevada was one of the first states in the United States to start doing that. Other states since have copied him, copied the program, which is good, but he was a visionary.

This is interesting, because just yesterday Don Duncan loaned me a map of the gold properties in Nevada, published in 1976. It was from the Nevada Bureau of Mines. Would this have been a result of some of the work that was done early on?

Well, I turned out the first maps of gold and silver, just to show the deposits. When I started with the Bureau of Mines there was nothing there, no information, no records or anything. The first thing I did after being hired—almost the first thing—was a long-term program, but I went to the library and I read every publication that had anything to do with Nevada. I made index cards and indexed it by mine name, by mineral, by commodity, and by county, because I was embarrassed that people would write me letters and ask me, “What can you tell me about the Joe Jones Mine in Mineral County?” I couldn't tell them anything. Well, after I got my card index all set, I could look up and see if anybody had ever published anything. It was possible to do that at that time. Today, you couldn't possibly go back and read the literature—it has just exploded, like all science literature—but in Nevada at that

time, you could, so I was very proud of that accomplishment.

I had thousands of cards that I pulled together, so that was one of my main researches, and that was useful. Now, from that we were then able to turn out maps showing the locations of various mines and their production, mining districts, some basic information. That's what we were building at that time: just what has gone on in the state of Nevada. Where are the lead deposits? Where are the copper deposits? I did reports on some of the industrial minerals, barite in the first part or two, to encourage development by mining companies. They'd like to have the basic data, "What do you know about your state?" We had to know something, so we got busy putting it together. [laughter]

Did that also include looking back at the history of mining in Nevada? Did you pick up any historical information on those mines, or was it primarily what's in existence?

Nothing new, really, because we were doing it through the literature. Nothing new. Not interviewing people. What history I might have picked up would be by accident, rather than by purpose.

There have been some excellent articles in the past, publications by people in the U.S. Geological Survey and by the U.S. Bureau of Mines. A gentleman named William Vandenberg did a study of most of the counties in the state, and they were labeled, "A Reconnaissance of Mining Districts in Humboldt County" or Pershing County or whatever. He did a splendid job of bringing that up, of looking at the history and what was going on at that time. That used to be the first place I'd look. Of course, those were done in the 1930s, and that was a lot closer to 1950 than it is to today, but they were a good background.

The U.S. Bureau of Mines used to do much more detailed data than they do now. They don't do it at all now, because there isn't any U.S. Bureau of Mines. The Geological Survey continues, but in the *Minerals Yearbook* under Nevada, there would be a description of all the mining activities. I recently wrote a history of Getchell Gold Mine, and a fair amount of that data, I got by going through the old *Minerals Yearbook* series of the U.S. Bureau of Mines. It tells you what's going on each year in every state.

I guess there's several reasons why there's less of that data available now. One is that mining is much more complicated and, certainly in Nevada, much more diverse. The smaller activities are buried by the major activities, so nobody writes about the smaller activities. The other reason is that the budgets from the federal government for doing this have been greatly reduced, and the interest has disappeared. With the Bureau of Mines and its research centers there was local knowledge and local content. There were people within the bureau assigned the responsibility of knowing what was going on in the state and then writing the annual chapters for Nevada. That's not true anymore. So, if the history you're looking at is difficult to come by, somebody a hundred years from now, trying to get it, is going to have a lot harder job. [laughter]

Vandenberg going back in the 1930s, that gave a benchmark. At least that was done. Now, if these annual yearbooks are not happening, then we're losing some of that information.

Well, the survey did. Geological Survey did professional papers on Goldfield, Tonopah, Pioche. Amazing work when you think of the limited time that the people spent there and how much they were able to put in a professional paper. That gives you the whole history of lots of the mines.

You worked on indexing what was available and worked on the mapping?

I did write an outline history of Nevada mining. Lincoln was an early dean of the school of mines, and at the bicentennial of the state I stumbled on a manuscript by Lincoln that had never been published, which was kind of an outline of Nevada mining history. I thought, "Well, this is pretty good." He took it up to 1925. I continued somewhat that style and went from 1925 up till 1963. More recently, Joe Tingley has added to it and republished it again. I hope that continues. At least that will keep one thread going. [laughter]

Well, you did some interesting work while you were there, about the mining in Nevada and documenting what was around and helping the small miners. Did you enjoy that?

Oh, I did. The Bureau got large enough that we needed separate direction, and so Dean Scheid hired Jerry Jerome, the first associate director of the Nevada Bureau of Mines. Today, the head of the Nevada Bureau of Mines is called the director, but at that time Dean Scheid did not wish to relinquish the title of director, and so whoever was running the Nevada Bureau of Mines was the associate director. So Jerry Jerome was hired as associate director. He was a very accomplished economic geologist and had worked for Kennecott and a few others till he became the director for several years. Then, he resigned to take a position with Kerr McGee, and Dean Scheid started searching for another director, and so I approached him about being associate director. By golly, he hired me as the associate director, which I greatly appreciated.

What years were you associate director?

1965 and 1966. It was a lot more responsibility. Wiped out some of my travels. I wasn't as free to schedule my time pretty much as I wanted to. Others were scheduling my time for me, so it was a change. One reason, I think, that he appointed me is that the university got funding to build a new building, which is now the Scrugham Engineering and Mines Building, but there was discussion on the campus about who's going to be in what. Dean Blodgett was the Dean of the College of Engineering, a fine gentleman, as admired by his students as Dean Scheid might have been by his, but Blodgett did not want to share any space or money with the School of Mines, and I can remember being in one meeting where Dean Blodgett said to Dean Scheid, "You'll not get one square foot of that building."

Dean Scheid afterward said, "Bob, we've got to work on this. If we get that, I'll buy you the finest bottle of whiskey money can buy."

We worked on it, and we ended up with one large wing of the building. So it's the Scrugham Engineering and Mines Building. The Nevada Bureau of Mines moved out of its very cramped space in back of the School of Mines, which was the original U.S. Bureau of Mines Building—it now is occupied by the university engineering or Buildings and Grounds—into this mines wing. I had much to do with the design of that. Fred DeLongchamps was the architect on it, and it again was an opportunity for me to work with Fred, which I thoroughly enjoyed. I traveled quite a bit looking at different labs, different geological engineering setups, U.S. Geological Survey, other state surveys, other colleges—so we could get the best we could find. I think that impressed Dean Scheid, too, and that helped. It was finished before I became associate director.

As associate director, what do you recall were some of the major projects that you worked on?

Well, a major project we took on before I was associate director was the Shoal Project out of Fallon, where the Atomic Energy Commission wanted to detonate an atomic weapon to compare its seismic signature with that of an earthquake. The Dixie Valley Earthquake of 1955 was not far removed from the site of the Shoal bit, and so we did much of the work there. I guess it was the AEC at that time, Atomic Energy Commission. They had approached both the U.S. Geological Survey and the Nevada Bureau of Mines about doing this project and asked us to bid on the work. We saw an opportunity to earn some money to buy some necessary equipment. [laughter] So we bid on the job, and we learned later we came in at a fraction of the cost that the U.S. Geological Survey had put in for, which would be typical Geological Survey, I might add. [laughter] So we did that; it was an enjoyable study. We got many, many compliments for the work that we did. Jerry Jerome had a splendid vision of what had to be done and how we would go about doing it, and we made \$85,000.

To finish the story, though, at that time the Desert Research Institute was being considered at the university. It was advertised to the university faculty. I left out the fact that I was chairman of the university faculty for one year, and this was about that same time. It was being touted as a substitute for the graduate dean, whose job was to help faculty members get grants for research and so on; the Desert Research Institute instead would work full time to do this sort of work. Armstrong was then president, and when he hired Wendell Mordy, who was a meteorologist for a pineapple plantation in Hawaii, to come over and run the DRI (I never quite understood why), Mr. Mordy and I did not really get along well. The university and President Armstrong did not really have any funding for the DRI. He was carrying it, as all presidents can do, with a little

money here and a little money there, and he looked over and saw \$85,000 in the Bureau of Mines, and he reached and took that and put it into the DRI, so the Nevada Bureau of Mines is the basis for the start of the Desert Research Institute. [laughter]

Against their wishes?

Against their wishes. Oh, yes. Deeply against their wishes. As director, I had some very nasty moments with both Mordy and Armstrong, expressing my opinion. [laughter]

But did you have any ultimate control over that money?

No, it was the president's to do with as he wished. It was the university's money.

Tell me about the Shoal Project. Was that atomic weapon actually set off? And what was your role?

Yes, it was set off. We did the geology of the area. It was necessary to know the geology well, because that could have some influence on the seismic signature. At that time there was great concern about how much underground testing the Russians were doing. Both the United States and Russia were to let each other know about what testing they were doing, but the question comes: are they really telling us all, or are they carrying out tests that are hidden from us? If you did tests in a seismic area, would the seismic signature—the signal you got—be the same as that of an earthquake, or could you tell the difference? They decided they'd drill and fire a shot, which they did, a twenty-five kiloton shot at that area.

I was sitting on the surface when they fired it. We were invited to be there, and it was kind of a unique experience. We were about three thousand, I don't know, feet or

yards. Must have been three thousand yards away. Didn't seem that far. We were on a hillside above it, where we could look right at the spot, and I sat down purposely to feel it as best I could, and when it went off, the ground rose and then settled back down at the site. You could see it. The hill kind of turned to Jell-O. It wasn't a sharp shock, like an earthquake or something. It felt like you were sitting on a bowl of Jell-O. It just rocked like that.

There was an article in the paper just a few days ago. Every so often there's a publication or an article some place or other that says "the secret Project Shoal" or something like that. It wasn't secret at all, but somebody in Fallon that doesn't bother to look at the background and the information thinks it's something hidden, but just recently in the paper, or on TV, the DOE now is back drilling some holes around there to see if there's been any migration of radioactive materials.

Were you concerned about radioactivity at the time?

No. I think it was a nine-hundred-foot shaft, so it was buried deep, and there was no likelihood that it would crater. There was always the concern with an underground shot, that something might go awry, and that radioactive gases would be vented to the atmosphere. As soon as the shot goes off, airplanes fly over to see if there's any radioactivity, and when they find none, then the ground is occupied. There was no leakage from there. It was fun being there. I had always wanted to go down to the test site when they were having airborne shots and see one. I could have done that, but I never got around to it. I've been underground where they've had other shots down there, but didn't ever see any airborne ones, which might have been lucky.

Do you think they're going to find some radioactivity now?

Well, it's certainly radioactive where the shot went off, but how far it migrated, I'd really know very little about that particular science. A lot of the radioactive nuclei are tied up rapidly in clays or in feldspars. They don't travel far at all—like millimeters—but some of the water-soluble elements, tritium, or some of the gases might migrate further. That's the only project we had like that. The rest of it was rather routine.

So that \$85,000 was used for beginning the DRI, even though it was started over your objections. Did that conflict settle down after a time?

Oh, yes. Sure. I knew at that time, or I was fairly certain at that time—I had some experience with Stanford Research Institute—I could see what was going to happen with DRI, that it would be directly associated with the university, closely associated. It would, as the promise was, help the faculty for awhile, but then it would go its own way, and that's exactly what's happened. It's a separate branch of the university now. At Stanford, the Stanford Research Institute is no longer associated with the Stanford University. And I would suspect down the road the same thing will happen with the DRI. It will become a separate agency altogether. Things grow like that. [laughter]

Is there anything else about your time as director that you wanted to mention?

I was sitting at my desk one day looking out the window. I'd been there ten years. There is nothing as secure in this world as a job at a university, because by then I had tenure. I knew exactly what my salary was going to be on down the road. Then retirement. Looking out the window, I thought,

“Twenty years from now, you’ll be looking out the same window, doing the same thing.” I went over to quit. [laughter]

Just like that—without anything on hand to do next?

Right.

You had a family at this point, correct?

Oh, Bev and I were married in 1952, just before I went in the navy, and then we had three daughters. Now I want to back up a little bit. I did have something in front of me when I quit. I went with Bill Pennington. He was doing oil well exploration in Railroad Valley, kind of a swinging-type guy with a lot of charisma. Do you know the name at all?

Is that the same Pennington that was with Circus Circus?

Yes. So, I went with him to do geology. He and I essentially became partners. I had ended up with a drill rig, and I was running the drill rig, drilling holes out there. That was an education. Hard, miserable work.

Hard, miserable work? [laughter] You weren’t looking out that window anymore.

No. Gosh, I was out there one time for a month, and it was twenty-eight below zero every night, things frozen up tight. With an oil well, when you’re drilling, you’ve got a lot of money tied up, invested. When something goes wrong, you’ve got to correct it now. You can’t go back to the motel and say, “Well, I’ll have dinner and think about this.” You’ve got to come up with the solution, if you can, now. Mostly it’s getting stuck, or some problem is coming up, or an engine goes out, and you’re in the middle of nowhere. So, it keeps you active. [laughter]

We got some production. We were selling the oil in Utah, and the refinery there told us they weren’t going to buy any more oil, and we were able to make the contract with Shell Oil to sell it to them in Bakersfield, but we had to truck it, so we ended up buying three tank trucks and trailers to haul the crude oil to Bakersfield.

How can we make a little more money? Well, we bid on contracts then for products. We supplied the fuel oil at the Tonopah radar site and at Hawthorne; we were back-hauling fuel, and then for Fallon. So we were in the trucking business and the crude oil business, the production business, the drilling business, back-hauling finished materials and selling that, government contracts. Did the whole thing. It was great education. [laughter]

Then two fellows that had worked a little at twenty-one slot machines came to Bill. They were interested in keno machines and didn’t want to stay with their company anymore, so Bill and I started working with them on developing the keno machine, and we got in the gaming business.

Well, we got in it by reason of this slot machine and started Raven Electronics, which was the first one to make electronic slot machines. Not everybody wants to buy your material. They’d like to share the income with you, so we had to form a little company and get gaming licenses, and they could put machines out and participate with us. So I got in the gaming business down in Las Vegas. It was a part that I didn’t like and ultimately lead part way to my leaving. Dealing with Las Vegas gamblers—the best I can say is, as soon as you were done, you ran back to your motel and took a shower. [laughter] That has changed, too. It’s all corporate business, but it wasn’t at that time. You were meeting with the former members of the Purple Gang out of Chicago. Nice guys, but there was not one you’d really want to take home to mother. So that changed.

This is pretty far removed from geology.

Oh, yes, it was. That's how things happened with me. [laughter] It was an interesting time. Well, we were developing additional electronics materials with Raven Electronics—besides gaming—various communication devices that were going quite well. We needed additional funding to do all of this; plus, we hoped to expand the oil business. Jerry Jerome, who used to be the director of the Nevada Bureau of Mines, had left Kerr McGee, and he and two other fellows had started a brokerage outfit in Vancouver, Canada. To make a long story short, through Jerry we got acquainted with a Swiss banker who ended up investing a million dollars in the oil business and in the electronics business, and with a fair stock position we had some other investors.

Later on, Jerry Jerome, through his partners and some of the stockholders, became dissatisfied with Bill Pennington's management. I really don't know why, but they did. A kind way to put it is, they asked Bill to step down, which he did. Bill is very charismatic and can be gracious when he wants to. He's also a very sharp businessman. Sometimes, for my bit—it's not a criticism—he's *too* sharp. So Raven was moved elsewhere, and I went with Raven and left Bill Pennington at that time. I stayed with Raven a short time, and it wasn't a place I should be or was interested in, so I left. There was nothing going on in mining at that time, early 1970s, and so I went to work with a friend, Vern Meiser, doing construction, mainly building warehouses.

Now, you say there was nothing going on in mining?

There were no employment opportunities in Nevada, and I was not interested in leaving Nevada at that time. The gold mining hadn't started yet. The Carlin mine had

been discovered, and it was operating, and the Dee Mine, I guess, was going, but the major explosion had not yet taken place, at all.

For about three years I was with Vern Meiser, building warehouses. I was chief of construction. The warehouse business was booming, and I built a million square feet or more of warehouses, tilt-up concrete. I became an expert in concrete and tilt-up and whatever else. [laughter]

Then, I heard through a friend of mine at the university that Bendix Field Engineering was looking for a regional geologist for an office they intended to open in Reno. Upon further inquiry, I finally made contact with a gentleman who was over here looking for that person, and I was interviewed by Bendix. I was hired as regional geologist for the Reno office. Bendix had a contract with the Energy Research and Development Administration—it was no longer the Atomic Energy Commission—for the National Uranium Research Evaluation Program, abbreviated NURE. President Carter did not want to see a proliferation of plutonium throughout the world—it's a very bad element—and that was threatened by the construction of breeder reactors. Breeder reactors convert the isotope uranium 238 to plutonium. You generate more fuel than you use, and Jimmy Carter didn't want to see that happen, so he told the rest of the world, "You don't have to go for breeder reactors. The United States has plenty of uranium to supply all the nuclear reactors that you want." But then he said, "How much do we have?" [laughter]

So, Congress funded the National Uranium Research Evaluation Program. It was to evaluate the uranium potential of the United States. Bendix had this contract, so they were opening field offices around the U.S., and Reno was one. The office at that moment was in Salt Lake City, and I commuted to Salt Lake City for about three months and then opened an

office in Reno, and we started doing the field-work required by the NURE project. That was in early May of 1976, I think. Arch Girdley was my boss. He was an assistant director out of the Grand Junction, Colorado office. The Grand Junction office was the headquarters for this activity.

In the spring of 1977, Arch Girdley called me and asked me if I would like his job or not. He was responsible for three field offices: Anchorage, Alaska; Spokane, Washington; and Reno, Nevada. It would require me moving to Grand Junction. I said, "Let me think about it." I wasn't anxious to leave Reno and start running around looking at three field offices.

So, about a week later, the director of the geology division, Jack Tham, called me and said, "How would you like my job?"

"Your job?" He was director of the geology division. Well, that was quite a step up. There were about 180 people in the geology division, nine field offices scattered across the United States and Alaska, a large activity in Grand Junction. So, I went over and talked to them and talked to the general manager, Chuck Greenslit, and said, "Yes. I think I will." [laughter]

It required the approval of the ERDA people in Grand Junction. It took them a couple of months to come around with the idea, but they did accept me. Beverly and I moved to Grand Junction, where I would be director of the geology division, which was a fascinating opportunity.

Things happen as a result of very small events. The ERDA people wanted to look at some of the playas—dry lakes—in Nevada as potential for uranium. Uranium oxidizes very easily, and when it oxidizes it is soluble in water, slowly soluble, but when it's reduced it precipitates fast, and playas have a reducing environment. Waters coming in the playas can give uranium. Some of the playas in Nevada are enriched in uranium, not ore grade, but enriched somewhat. So the

ERDA decided they would drill a series of twenty-five shallow holes in Carson Sink. I wrote a memo saying, "That's the worst playa in the world to drill in; it's a very complicated arrangement. Let's start with some small playa that we have better control on, so we know what we're looking at and then later on . . ."

"No, we're going to drill twenty-five holes in the Carson Sink."

I wrote another memo that said I think that's a dumb idea, and then they decided they would drill one hole to 8,500 feet, which made even less sense. I wrote a real nasty memo on that one, but as it turned out, the last thing I did in the Reno office was managing the drilling of this 8,500-foot hole. My background in the oil business came in handy, because I knew everything I was doing with drilling this hole. The reason Jack Tham offered me the job—he was moving up to assistant manager—he wanted somebody that would talk back to the ERDA people, the government people, and I was doing that, so I got hired. [laughter] That was a very interesting job. They paid pretty good salaries. I had highly qualified people with lots of enthusiasm, lots of ambition—lady geologists, male geologists.

Was this the first time you started to see women in the geology business?

Yes, it was. There were certainly ladies in there, but that was about the start of the rapid expansion in the 1970s.

Before that you hadn't seen women—not in school, not in any other job?

No. Ladies weren't in it.

How did that go?

It went fine. There was some resistance by some, a few. I never really heard any criti-

cism like, “Why are the women out here doing geology? They can’t do the geology.”

Quite the opposite. The people said, “Gee, she’s doing a pretty good job.” You could get in some trouble. I did, indirectly. We had a team working out of Durango, Colorado, two fellows and two ladies—girls, really. [laughter] Young ladies. They were doing field work. One evening the two girls did not come back from the field, and that’s not unusual for a geologist. You get stuck or something like that, but the two fellows called in to Grand Junction to let us know about it. Chuck Greenslit, the manager there, chose to tell the girls’ families that they had not come back, but the sheriff was searching for them. Probably, their vehicle broke down, and there should be no concern.

Then we got a call that said, “What are the air field capabilities at Durango, Colorado?” The father of one of the girls was president of International Harvester, and he was coming with his jet to find out what was going on. [laughter]

Well, early the next morning the two girls drove into town. They had got stuck for the night. It had turned dark. They decided they’d be better off camping, and they did exactly what they should have done. They got their truck unstuck the next morning and came back in, and everything was fine.

I would get criticized by the DOE—by then it’s the Department of Energy—because I didn’t have enough blacks working at Bendix. I’ve only met one black geologist in my entire life. Inner city people—I think the reason there aren’t as many black geologists is that they never *hear* of it. They don’t know that there’s a geologic profession, but anyway, I’d get criticized for that, and they were always looking at me, “Do you have enough women geologists working for you?” When this happened, then the charge came, “Why did you have two women geologists out in the field by themselves?”

My response was, “I didn’t know if they were women or men, and I didn’t give a damn.” [laughter] They were geologists. They go where they’re told to go. [laughter] They did excellent work. I still meet ladies from time to time that come and introduce themselves, “I worked for you in the Bendix program.”

So, it was changing, but you didn’t see a big backlash of non-acceptance or hazing or any of that kind of thing?

No. This is going to be a little bit unbelievable, but I’m almost sure it’s true. There were occasions when they would be in remote areas and would share a room, and I am as certain to this day as anything that there was no more Mickey Mouse than there would have been with two guys. They were out in the boondocks doing geology. I suppose, maybe, I’m a little innocent on occasion, but I’m quite confident that that usually was the case. Well, the fellow probably would have fought to the death to defend his female partner, because they were buddies. [laughter] They were called partners. They were working together. Sex never reared its ugly head. Geology was there instead.

You didn’t have the sexual harassment issues that you have today?

I can remember one occasion. We had an office in Austin, Texas, and I started hearing some big rumblings about sexual harassment concerns down there, which was a little amazing, because the man in charge had worked for me in Reno. He was a staunch Mormon and straight-laced as anybody ever was, but not all his employees were. I had a lady administrative assistant, who was a crackerjack for me. Donna was her name. I said, “Donna, fly down to Austin, and see what you can find out.”

So, she flew down there. This young lady was amply endowed and wore nothing but T-shirts. Donna would say to her, "Do you know what signals you're sending out? Wear something else."

And the girl was surprised. She insisted that it had never occurred to her that that might be a problem. She changed her dress, and that was the end of that. That's Donna. Thank you. [laughter]

How long did this project last?

Well, it was getting wound up. We had a final date, and the final report had been prepared, but we were still doing some wind up work. The phone rang one day, and it was John Schilling, who had taken my position as director of the Nevada Bureau of Mines, and he said, "Call Dan Miller in Washington." They were looking for a director for the U.S. Bureau of Mines.

I said, "John, I don't want to go to Washington, D.C. I Love Grand Junction. Bendix is a great outfit to work for."

So, we talked for awhile, and he says, "Call him, anyway."

I had met Dan Miller. He used to be the state geologist of Wyoming. So I gave Dan Miller a call, and he said, "Write me a letter telling me why you should be director of the Bureau of Mines." So I wrote him a letter, but I didn't tell him why I should be director of the Bureau of Mines. I told him what I thought were problems with the Bureau of Mines and what should be done.

So, a day or so after he got the letter he called me up and said, "Can you come back for an interview?"

"Yes." I had a field office in Pittsburgh, and I happened to be going to Pittsburgh. I said, "Well, I'll go to Pittsburgh, and I'll drop in at D.C. and talk to you." So, I went in and met with him and a fellow named Perry Pendley for a couple of hours, and we talked about the job and such. They told me that

Jim Watt, who was then Secretary of the Interior, would have lots of questions. They gave me some of the questions, and they had to go to a meeting for an hour or so, so while they were gone I wrote down a billion answers to all these questions that I thought Watt was going to ask.

Dan Miller came back, and we went up to see Secretary Watt, and they introduced me. We talked very briefly about things in general, and then he turned to Dan Miller and said, "Well, since this is the man you want, what are we waiting for?"

I thought, "Oh, this is happening kind of fast."

Then he said, "This is a political appointment, you know, presidential appointment. Do you know any politicians?"

Well, I knew that Laxalt had got Jim Watt the job, and I had worked on many of the Laxalt campaigns—my brother was his state chairman. [laughter] I said, "Yes, I know Paul Laxalt."

"You know Paul Laxalt!"

"Yes." So, that was that. I came back home, packed, and made a couple trips looking for a place to stay in D.C., bought a townhouse, moved back to D.C., and went to work.

You moved your family there?

Yes, just Beverly and I. By then all the children were adults and had left home. That was 1981. The Bendix project was essentially done. The final report had been completed, and it was just getting rid of the field offices. Most of the field offices were closed. So, it was a good time to be leaving. We were looking around by then for additional work for the group to do. Unfortunately for them, none was found, and Bendix laid off everybody. That was the end of the operation there, so it really was perfect timing.

The Bendix thing was lucky for me, because it gave me the national exposure that

certainly helped secure my appointment as director of the Bureau of Mines. I had met a couple of times with the state geologist to discuss the NURE program. Besides my own people, I was also responsible for contracts with many of the state geologists and universities, so I had a lot of acquaintances, and some of them were involved in the selection of the Bureau of Mines director. There were two of them, in particular, that were close to Dan Miller. They had helped him get that job, and they were also high on me, fortunately, so that's how I ended up there.



Tell me about your family.

I married Beverly Burhans of Winnemucca, Nevada. We were sweethearts in high school, and I went in the navy and later into college, so we kind of lost track of each other a little bit. Then we gained track of each other again and were married in 1952. I had a small consulting firm in Reno at that time, doing oil and gas work, but I was also aware that the navy was going to get me very shortly.

The Korean War was going on, and I'd stayed in the reserves. The navy wanted me, so January 5, 1953, I reported to Newport for Officers Candidate School. Beverly and our first daughter, Debi, came with me. We found a house in Newport that a lieutenant stationed there owned, but he was being transferred to Boston for about three months, which fit our schedule perfectly, so I put Beverly and Debi in the house, and I went to the base and walked in the gate, and knowing the rules, I was not allowed to come out for another three weeks, which was a very long time to be absent from my bride, and she was in a brand new, little town of Newport, but we managed to get through that with daily phone calls. Debi was just six months old.

From there we traveled about to Jacksonville, Florida; Washington, D.C.; and Alameda, California. By the time we got to Alameda, Beverly was with child again. Robin, the middle daughter, was born on November 13, which was her older sister's second birthday—both born on the same day. Robin was born at the Oak Knoll Naval Hospital, and I remember the charge was fourteen dollars for drugs and dressings not normally carried by the navy.

From Alameda we moved to Mountain View and Sunnyvale, California. The base is in Mountain View—Moffett Field—where I joined a fighter-bomber squadron. Nine months later, in July of 1954, I got on board the Yorktown and left the U.S. for nine months. Beverly took the two girls and came back to Reno and rented a small stone house on Hunter Lake Drive, not far from where my mother and sister were then living.

The phone calls were better at Newport than the letters, but many letters were exchanged over the course of the nine months, before I came back. I was discharged when I got back. I don't know if I mentioned this before, but I was sitting on this ship in Manila Bay, reading magazines about all the uranium exploration and discoveries that were being made, and I thought, "I got to get out of this man's navy." I started going through the BuPers manual and found that little rule that fit me, so when I got back, that got me out. I came back to Reno and joined Beverly. Beverly met me at the ship. Just this morning on the morning's news, it showed the carrier Roosevelt coming into Newport in Virginia, and Beverly still gets teary when she sees a ship coming in with sailors jumping off. [laughter] She remembers meeting the ship.

I wanted to get back to geology, and I did some uranium exploration for a few people. I started doing a little consulting work again, but things were rather slow at that time, and the job at the University of

Nevada with the Nevada Bureau of Mines was advertised. I applied for that and was hired. I got out of the navy in April of 1955 and went to work at the university January 1, 1956.

So, essentially, your family traveled around with you in the navy, except for that nine months that you were gone.

Yes. They wouldn't let them on the ship, which I thought very narrow minded, but . . . [laughter]

The first year at the university, 1956, the third and last daughter was born—Cindy. Debi is the oldest, and Robin is the middle one, and Cindy is the youngest. Both Debi and Robin live in Reno, and Cindy lives in Las Vegas.

They were essentially raised here in Reno?

Yes. They grew up essentially in one house on Brisbane Avenue. We moved in 1956 into a house at 2150 Brisbane Avenue, and we were there for twenty-one years, so the girls grew up there. That's exactly right. When we left Brisbane Avenue to go to Grand Junction, Colorado, they had all left home by then.

So that's pretty good for the mining industry, to be able to stay in one place.

Oh, very unusual. Yes.



One of the things that you talked about was the NURE, National Uranium Resource Evaluation, while you were at the Bendix Corporation. Nevada did not have much uranium, and I wanted to just have you talk a little bit, particularly, about the projects that you worked on in uranium and how the public's awareness and attitude has changed over time about that.

Well, President Carter was concerned about breeder reactors and the proliferation of plutonium. There are two principal isotopes of uranium, uranium 238 and uranium 235. Uranium 235 is the isotope that is used for generating electric power and also in weapons. The 238 is not suitable, but if uranium 238 is packed around a reactor, the neutrons in the reactor will convert the uranium 238 to plutonium. Plutonium is an excellent fuel and is also used to make weapons. President Carter was worried that plutonium would fall into the hands of terrorists. It is a very poisonous metal, and I understand that it is much easier to make an atomic bomb out of plutonium than it is out of uranium 235. So that concern led him to state to the world that the U.S. had enough uranium to supply all the reactors that any country might need to generate energy, and there was no need for breeder reactors.

Having said that—Carter was a nuclear engineer himself, so he had some experience on that side, but not on the resource side—he asked that a survey of the United States be made to determine the uranium resources of the United States, and that was the initiation of the National Uranium Resource Evaluation program. It was first assigned to the Atomic Energy Commission, which was later expanded to the Energy, Research, and Development Administration, which was later expanded to the Department of Energy. I worked under all three of those, although it was the same people—they changed the name on the front gate—through the NURE program. [laughter]

Bendix Fuel Engineering Corporation bid on and was awarded the bid by the department—by the AEC at that time—to conduct the National Uranium Research Evaluation program. It was contracted out, most of it. There were parts of it that the AEC did itself. The airborne surveys were done by the AEC, and there was a hydro geochemical and stream sediment sampling program—very extensive sampling program—that the AEC

directed, but that was conducted by the national labs—Lawrence Livermore, Los Alamos, and some of the others.

It was a headache in that the inability of the national labs to conduct that program resulted in the geology division of Bendix Field Engineering Corporation doing much of the sampling, in order to try to catch the program up to speed. There were three components of the program. Two were: the sampling program, which took about 2,500 stream sediment samples in every two-degree quadrangle, and an airborne radiometric survey program, which flew flight lines, depending on the geology, at anywhere from ten-mile spacings to three-mile spacings over most of the United States, giving you an airborne radiometric map. These were very detailed maps.

Those two products, the airborne maps and the stream sediment surveys have been very useful to my geologists, and that's what the intention was—for them to use them—but they never, ever were completed on time. I had a fixed date on which to complete the geologic work, and the work was completed by that date—absent, in most cases, the products that were the responsibility of the national labs.

My low regard for the national labs began then. Matter of fact, Lawrence Livermore was fired from the project, because they could not accomplish the work. Sad. It seems impossible, but that was the case. Very poor management. Lousy management on the parts of all the national labs. Any experience I had with the national labs has been a disaster, and I had similar experiences in the Bureau of Mines. It continued. Incompetent with huge budgets. They'll be there forever, because every senator is very proud of the money that is spent in his state, and every representative in his district, by these damn national labs, and they're not about to be done away with.

I had some association all right with the uranium and nuclear energy while at the

University of Nevada on several occasions. Went to the Nevada Test Site. Went underground. They were interested in public relations, and so they invited the Nevada Bureau of Mines to look at some of their work, so I was underground where they had underground nuclear explosions, and discussed with them some of the fallout problems. One fallout came over the city of Reno, and there was substantial fallout here. That would have been (oh, I won't have it exactly right) around 1962 or 1963. It was an airborne shot at the test site out of Las Vegas, and the wind was such that the cloud of radioactive material dust was carried over Reno, and unfortunately, when it got to Reno it rained, and so much of the dust was washed out of the air and deposited in Reno. I became aware of it when our newly hired chemist called me from the state lab and said, "Bob, all my scintillometers and Geiger counters are going haywire."

I said, "What's the matter?"

He said, "Well, come over. I'll show you."

So, in the middle of his room they were normal, and when we walked towards the window, they went off scale. "What in the world is doing that?" So, I took one of them and went outside and all the puddles of water in the quadrangle were radioactive where the dust had been washed in these puddles and washed off the brick walks, so the brick walks weren't radioactive, but all the puddles were. About that time the newspapers got hold of it, and the city health department, and there was great concern about the fallout in the reservoir and so on.

It was fairly short-lived radiation, in that within, oh, a few days to a week, I don't believe we could detect any background radiation at that university. The instruments we had were for exploring for uranium. They're extremely sensitive. They're useless for health purposes; they're too sensitive to measure radiation for health purposes. They go off scale long before there's much danger to people.

So, it was hard to know whether that was a danger to people, or was that ever determined?

I don't think it ever was determined. I don't think anybody ever made a reading on exactly what the radiometric levels were, and of course, the DOE, or then the AEC, wasn't anxious to make any noise about it either, as they didn't over Utah.

Because normally the clouds went over towards Utah?

People generally were not suspicious of what was going on. It was only much later when some people in Utah found there was a higher incidence of cancer of one sort or other.

But at that time in the 1960s, you weren't getting any negative public reaction to the test site and what was happening there?

No. The state of Nevada was very proud about the test site. It brought a lot of money to Las Vegas. I have still not ever heard any negative reaction to the test site. Matter of fact, both Nevada senators initially fought to maintain the weapons test program, so that the money would continue to come in to Las Vegas. Now, the airborne shots were discontinued, but that was the result of a treaty with the Soviet Union. Everybody agreed not to do any more test shots, because there was more and more radioactivity getting into the air. Some of it was useful; some of it was not. Ground water measurements have been greatly enhanced by the airborne shots in that the tritium was one of the isotopes generated in an airborne shot. And if one finds tritium in the ground water, then you know that the ground water is not older than the earliest atomic bomb shot. If there's no tritium in the water, then you know it is older than the first airborne shot.

So, you can track where the ground water is coming from and how recently it got here?

People got more concerned, I think, as the radon issue was brought up by EPA. I think EPA personally goes out and seeks lots of issues. I have never seen demonstrated any correlation between radon in the home and cancer. The EPA set a level for radon without any scientific basis whatsoever. Now, whether that level is too high or too low, I think, is unknown, but I haven't seen any scientific basis. In more recent years (and I haven't followed this closely) some people in the EPA had stated that the radon levels that they set were much below any health hazard. Radon is a gas with a very short half life, 2.2-day half life, but if one inhales it, when radon decays radioactively it becomes bismuth 214. Bismuth 214 is a rather intense gamma ray emitter, and that's what causes the harm in the lungs, but you're breathing radon right now, and so am I, because it's a naturally occurring gas.

In Nevada, anyway?

Well, everywhere. The concern being that it might get concentrated in a house by reason of local geology and improper ventilation, but I go back—I have not seen any study that showed any correlation between radon levels in a house and cancer.

So, that's where some of the concern started.

Well, the radon concern started with miners in uranium mines, who, prior to very high levels of ventilation being set, were breathing radon; and miners who smoked, in particular, did have a very high incidence of lung cancer.

Was that a problem here in Nevada?

No. There were a couple of small uranium mines, but I don't think that I'd ever heard of it being a problem in Nevada. It was in Utah and New Mexico where there were several underground mines, and a great jump was then made. If radon at high levels is bad for miners, radon then at low levels must be bad for citizens. It might be the difference between drinking and drowning, however. [laughter] Although cold water is all right, on the whole, that's not good, but that would never bother the EPA—facts.

I have some other good stories on the EPA. The EPA almost shut down the construction industry in the Eastern United States while I was director of the Bureau of Mines. They first became concerned with asbestos, and most of the asbestos concern is false and known to be false by those in the know, but it's so much publicized by the EPA that nobody is about to reverse those decisions. EPA went so far that they were within two days of declaring that all fibrous minerals were hazardous substances, and fibrous was defined as any mineral with a length-to-width ratio of greater than three. Under EPA definition this pen would be a hazardous material, except it's not a naturally occurring mineral. Well, the problem is that most all of the aggregates in the East are mined from metamorphic rocks, which contain fibrous minerals. Therefore, every concrete truck, every aggregate truck, every highway construction, every building construction would be a hazardous site. If you wanted to haul some gravel to your driveway, your truck would have to be covered with an airtight seal and have a car with a red light preceding it and one following it, and all marked "hazardous material." The EPA, upon being told this by the Bureau of Mines, withdrew their proposed regulation. [laughter]

And this happened while you were the director?

Yes. It was insane. There is an asbestos that is dangerous. Blue crocidolite from South Africa is a particular asbestos mineral, and it is hazardous, but low levels of asbestos have not been shown to be hazardous. Workers in shipyards in World War II, where large amounts of asbestos were used, did have problems. Asbestos miners have problems, but the occasional exposure to asbestos . . . A study was done in Canada of asbestos miners' homes and their wives and children. There they wear their work clothes home, and so the asbestos dust is distributed in the house, and the wives of asbestos miners in Canada have a lower incidence of lung cancer than women in Canada in general. Modest exposure does not appear harmful.

The EPA was also set to declare waters that contained asbestos hazardous, requiring that they all be filtered. The Bureau of Mines, the U.S. Geological Survey, and the Bureau of Reclamation spoke to EPA and explained that practically all of the waters in California contain asbestos, and that ingesting asbestos by drinking it has never been shown to be hazardous in any fashion, yet the EPA was within a few days of declaring that all such waters would have to be filtered, which would have required filtering the Sacramento River, the Feather River, the San Joaquin River. [laughter] You know, insane, with no basis.

Now, when these kinds of issues came up, was it a cooperative sort of situation, or did you just happen on the information that they were very close to releasing this?

We initially happened on the information, but fortunately, persons within the EPA recognized that they had a problem, and that they needed some additional expertise. I was able to establish a cooperative office in the Bureau of Mines that worked closely with the EPA on all mineral-related problems.

Well, it doesn't continue today, because there is no Bureau of Mines, but that made a great change, and we saved them from making fools of themselves. Early in the game they could come, and discussions would come up, and you could present the mineral facts to them, the mining side of it. A lot of it didn't have to do with mining. Minerals are used throughout industry in all sorts of things. They needed intelligent information on which to base their decisions, and they had not had it prior to the institution of that office.

I want to go back again to a little bit more on that issue about the attitudes about radioactivity here in Nevada. You said that as far as you can discern, there's not been a negative reaction to the Nevada test site?

No, I've never heard one.

And yet, now they're talking about storing radioactive material at Yucca Mountain and that whole, big issue, and there seems to be a lot of negative reaction to that.

Yes. I find no logic in either position. The storage would certainly be safer than the many underground explosions, because those isotopes are totally uncontained. There are studies underway now to see how far they might have migrated. Fortunately, it's my understanding—and it's something I understand—that a lot of the radioactive isotopes are tied up rather rapidly in clays and other minerals, and so they do not migrate a long ways, but there have not been extensive studies around the test site, to my knowledge, though I understand some are on now.

All of those underground explosions were done without testing at the time to see what was going to be happening, correct?

That was not considered. "The Russians are coming, the Russians are coming. We need more weapons." So that took priority. We were not nearly as bad as the Russians have been in their radioactive pollution, but we did a fair amount of it. [laughter]

So that area would be pretty well polluted at this time?

Oh, absolutely. Absolutely.

And the tests are not so much whether it's polluted there, but has it migrated?

Has it migrated, yes.

So, from your understanding and your knowledge, it would be less hazardous to have the storage at Yucca Mountain than what took place at the test site.

Yes. It's above the ground water table. At least, there's some argument of where the groundwater table is and has been in the past, and I won't get into that, but therein the fuel elements are sealed in casks that are corrosion resistant, surrounded by rock that is likely to absorb some of the isotopes. It's certainly a much safer arrangement than the one that now exists out in the flats where all the bombs were fired.

Well, the problem is, nobody knows what's going to happen to anything in 28,000 years. I think that's the half life of plutonium, so you've got to keep it for a long, long time, and there is no history of anybody keeping track. We haven't even kept track of the pyramids that long. [laughter] They haven't been around that long. So how is one going to keep track of what's going to happen to Yucca Mountain?

Or the world, as a matter of fact.

Or the world. Right. But something's got to be done, and the solution has to come, because 500 years from now, I can't see any answer for energy outside of nuclear energy. We're burning coal. We're burning oil. It's not going to last forever. I say 500 years, because coal will certainly be exhausted in 500 years. Oil and gas a lot sooner than that. Solar will not supply enough. You're going to end up with nuclear power. The United States now gets 25 percent of its electrical power from nuclear reactors. Most people don't know that. [laughter]

Japan, which is hysterical when it comes to radioactivity because of being bombed, gets most all of its electric power from nuclear power plants. If done right, it's a very safe way to make electrical power, and that will be the only way out in 500 years.

Interesting. So the public attitude has just really changed?

Well, I think it's with the extreme environmentalists, and I use that term cautiously, "extreme environmentalists," who have told the world that everybody is being poisoned and dying, which is a *grand, grand lie*. The cancer rate has not accelerated. People live much longer than they ever have, are healthier than they ever have been. There's no evidence for this death sentence we've all received by reason of industrial pollution. That's not the case.

The concern with radiation came because of the environmentalists—and some of it rightly so. I wouldn't minimize that. Also, the advertised gross errors of the national labs, particularly at Hanford, Washington, where there are billion-dollar problems in clean up, and at Rocky Flats, out of Denver, and other DOE and national lab installations, where there are severe environmental problems caused by poor practices of people that should have known better, that didn't. These are Ph.D. physi-

cists out of Stanford and MIT that screwed up something fierce and should be called to task for it, but I've never heard of that ever happening. [laughter]

That's the kind of thing that causes a breach with public trust.

Yes, and rightly so.

So, then they begin to question everything, and that doesn't help with finding a solution for the problem.

No. I was sensitized to it somewhat. The office that I had in Grand Junction was at a facility that was first built to aid uranium exploration, and then a mill was built there by the government to handle it. You might not understand that all uranium ore was purchased by the federal government. That was the only place you could sell it, and the government built mills to upgrade the uranium ore to yellow cake that could be handled, and one of those mills, as I say, was in Grand Junction. My office backed up against that mill. From time to time, ladies who worked in that office, usually when they were pregnant, became concerned about what the radioactive level was in the building, and particularly against the back wall that was against the mill building. We had it surveyed many times by independent health physicists, and it was always found to be very safe, but these ladies' concerns were very real. They were pregnant, concerned about their baby, and so I never hesitated to spend the money to bring in another health physicist to make another survey and to satisfy them. That experience led me to understand the concerns of citizens who have no background in the physics of radioactive substances. They panic. It's the Hindenburg syndrome again and the atomic bomb syndrome that killed all those people in Hiroshima and Nagasaki, and now it's going

to kill me. So it's understandable. They don't know that they live with it every day. [Sounds of opening a box]

OK. You just brought out a radiation alert monitor. Explain that again, what it does.

It's a radioactive monitor. It's a Geiger tube in there, strangely enough, and reacts to radioactive radiation, gamma radiation.

What happens if it gets hit? Is that the red light?

The light flashes after so many hits. This is for mineral prospecting, so it's not high, but it's showing a constant level of radiation in this room, which is correct. There is. [laughter]

We're not aware of that. I'm not aware of that, anyway.

Well, there's no way to sense it. High-energy particles can be sensed, as they discovered in space when astronauts would see bright flashes in their eyes. Those were particles accelerated from the sun that were passing through their eyes and hitting an atom in their eyeball and giving a bright flash, and they were seeing flashes. You're shielded from that by the atmosphere.

Well, you're luckier than most of us. You have a lot more knowledge about the radiation and the issues, but you've also watched it change—the public attitude and awareness—over a period of time. So, the environmentalists, you think, brought that to the public's attention, in general?

Well, I think they sensitized people to their environment, and there certainly are cases where the environment has been severely damaged, but it's not everywhere and every place, and rational decisions have to

be made concerning what we do with environment. There are rarely any studies on the cost/benefit ratio. What's it going to cost, and what are going to be the benefits? We can't afford to pay for everything that would be nice to do.

The whole environmental issue has gotten to be a major issue with mining in general, as I've been working on the mining oral history and going back to the 1930s where there were no regulations other than some safety regulations. Miners could just start an operation. Today it might take a year or two of licensing and regulatory hurdles to go through, before anything can happen at all—it's very costly. So that's been a big change over a period of time.

Well, the extreme environmentalists would have mining shut down—there's no question about that. That is not open to argument. They would do away with all mining. They would make much of the United States—and the rest of the world, if they could—wilderness areas. There's a new effort starting in Nevada to increase the wilderness areas. This isolates people again. You can't go into a wilderness area, except with a knapsack. There's no provision there for a family with children, or people that are not interested in hiking. It's removed.

The closing of mining is just impossible to understand. What they want to do is export our mining environment problems to foreign countries—out of sight, out of mind, I guess—but I'm quite sure that fifty years from now, there'll be no mining in the United States outside of sand and gravel, which is the largest mining activity in the United States, by the way. [laughter]

That's a very strong statement.

There's no question about it. They will succeed in shutting it down, by simply ter-

rorizing people. People do not know that their quality of life outside of a cave depends on mining. The heading of all my letters has on it, "Humanity is now and will forever remain dependent on minerals extracted from the earth by miners." That is a true statement. It will. But most people don't know that. Architects don't. I've talked with architects. Architects don't know that they work with mineral products. It's insane. Somebody brings it. They don't know where it comes from. [laughter]

It's sort of like meeting a child who doesn't know that chickens are raised on a farm and slaughtered. [laughter] They all come from Kentucky Fried Chicken.

Yes. Exactly.

We've gotten so detached from the processes that support our lives. The same kind of thing is happening with mining, where we all depend on the products produced by mining, but the environmentalists would have us believe we could live without it.

Yes, or they don't address the issue at all. An issue comes up, and the mining industry compromises, and then an issue comes up, and the mining industry compromises. They're going to compromise themselves right out of business. I don't see any way around it, really, because the environmentalists are supported by the general public. They think what they're doing is fine and healthy, but by not recognizing the impacts on the quality of their lives, ultimately.

You just named several serious issues for mining in this country: the environmental impacts, exporting those impacts into other countries, and also exporting those jobs into other countries. I've heard various people, as I've gone around interviewing some of the miners, say that the job opportunities

are not here. They are in China, or South America, or Africa.

Yes, because companies can't afford the expense of not necessarily complying with the environment—it's complying with the unknown, because the rules keep changing all the time. If you fund an exploration program in the United States, and you find something, there's absolutely no guarantee that you're going to be able to develop it. Mr. Babbitt or some other Secretary of the Interior may just foreclose on it, and you can't do that.

You have several risks overseas. Those governments may nationalize your mine. Now, that's happened in the past. Many countries in the world now are open to mining, and mining companies are again outside of the U.S. They weren't for many years. Nevada for many, many years remained as the sole place where miners could come explore and have some certainty that they'd be able to develop their properties, but even that is changing, as the public from my point of view gets sold a bill of goods, but you don't find the public interested in hearing that, either. I'm not out on the streets yelling, because it's very difficult for the mining industry to sell something to the public. Advertising kills you. When you see an advertisement about agriculture, it's quite likely that what you'll see in the picture is a farm table with a checkered tablecloth on it, the father in bib overalls, a girl and two boys; the boys are in bib overalls, and the mother is pouring a glass of milk. And that's agriculture. For mining, it's some poor bastard that just came out of a coal mine. He's black from head to foot, and the mine is blowing up in back of him. That's the Americans' picture of mining. Some of that was real. In the five years before the formation of the Bureau of Mines 13,000 miners were killed underground before 1910. The Bureau of Mines was formed in 1910 to bring an end

to that calamity, but some of that still hangs on in the public's mind, I guess.

So, when you started with the U.S. Bureau of Mines, it had been in business seventy years?

Yes. We had the seventy-fifth anniversary during my term of office. I served from 1981 to 1987. I might also mention that from 1981 to 1985 there was a 33 percent decrease in fatalities in mines. We advertised those mining companies who had poor safety records, and received very severe criticism from the mining companies for doing that, but in two years the mining company with the worst record had the best record, simply through that pressure.

I want to mention that the frontline responsibility for mine health and safety is with the Mine Health and Safety Administration. That used to be a function of the Bureau of Mines, but was transferred to the Department of Labor in the 1970s. While I was in D.C. we worked closely with that. It was administered by an assistant secretary of labor. The first one was Ford B. Ford from California. Strange name—Ford B. Ford. He and I became good friends and worked very closely together. Later, he moved on to another job, and Dave Zeiger took over, and we similarly cooperated. The Bureau and MSHA were supposed to be enemies, but that was in somebody's weird mind. [laughter] We worked very closely on those issues.

When you started working for the Bureau of Mines, what duties fell under the U.S. Bureau of Mines? What were you responsible for, the agency itself?

Essentially, research and information. Let's take the information part first. The bureau collected and published mineral production statistics and exploration mining statistics for the entire world. There were

about 400 people in Washington, D.C. and a few scattered elsewhere, who were responsible for the input into those programs. Each year they published these books that are up here. [laughter] *The Minerals Yearbook*. They reported on the fuels, non-fuels, non-metallic minerals, all mineral production. In the 1970s the coal and fuel reporting responsibilities were transferred to the DOE and, as much that goes with the DOE, severely downgraded. The industry in general was very disappointed with the results of the DOE's continued work on the statistics—not nearly as timely as the Bureau of Mines was, or as complete. People would still call up the Bureau of Mines and ask what the coal production statistics were. We informally kept track of those. [laughter]

So there was a separation between fuels, as in petroleum and coal, versus other minerals?

Right. In order to give the Department of Energy some more to do, the energy ones were given to the Department of Energy, which did a very poor job with them.

And to compensate for that you informally kept the statistics yourselves, because people would still call you?

Yes. The statistics are collected by the bureau by sending forms to mining companies, and with one very small exception—on bronze of all things—there is no legal requirement for mining companies to tell the Bureau of Mines what it was doing or what their production was, but the bureau agreed to keep confidential the statistics from any individual mining company, and to *not* report them on a state basis unless there were at least three major producers in that state; otherwise to lump them along with the U.S. Well, that promise was kept, and kept very honestly. Mining companies—it cost them

some money and man-hours—did fill out the forms and send them in. If they didn't, somebody called on them and asked for their cooperation. A few probably didn't comply, but the collection was done very deliberately and with great care. We used to get heck from Alaska for gold production, because Alaska insisted it always produced more gold. Well, a lot of Alaskan gold is produced as gold nuggets, and there's a pretty fair gray market in gold nuggets, to which we were not privy. So, Alaskans were right, but we reported what was the reportable production.

Now, this information was collected first by commodity specialists. There were one or more persons assigned to each mineral commodity: gold, silver, copper, lead, zinc, phosphate, sand and gravel, dimension stone. These people were truly experts. Most of them had worked in the industry before they came to the Bureau of Mines. They knew that industry upside down and backwards and had personal contact with all major players in that industry. The mining industry is fairly small, and a particular commodity is even smaller. There were also foreign area specialists, who were not uncommonly natives of the country. In the Bureau of Mines we spoke more foreign languages than the State Department. Can you believe that? We did. [laughter] These people knew those foreign countries upside down and backwards, in most instances fluently spoke the language, and in several instances were natives of the country. I would tell mining companies, "If you're going into a particular commodity or in a particular foreign area, the first place you stop is the Bureau of Mines."

I didn't know that the bureau had that detail until I became director. I was generally familiar with the Bureau of Mines. I find out today that most people did not know that that was available, that detailed information. I think I mentioned earlier on in the session that I had an uncle go to South Africa, and

he ended up settling in northern Rhodesia. I was talking to the Rhodesian specialist one time, and I said, "I had an uncle that went to Rhodesia."

"Are you related to George Horton?" He knew my relatives in Africa! [laughter] Well, my uncle was in the agriculture; he raised corn, but northern Rhodesia was a small area, so he knew him. Gave me the ranch's name. It was very interesting.

I was continually amazed at the depth of knowledge that these people have. It's gone now. The bureau was done away with. The people were getting older and leaving. I couldn't hire new people. It's an asset that the U.S. has lost, which no longer exists. Too bad. Too bad.

You said that there was also research?

Yes. The bureau also did research on mineral problems—health and safety was our largest budget—but also on metallurgical techniques. It had some skills. It was in large part responsible for developing the titanium industry, developing techniques that were used at Henderson, Nevada, starting in World War II for production of magnesium and then later titanium. That came out of the Bureau of Mines. The carbon absorption process used in gold mining in Nevada today was developed largely at the Reno research center.

Do you know who was in charge of that research project?

Zadra. Jack Zadra. Good friend of mine. He died quite a few years ago. The carbon absorption process was perfected somewhat at the Getchell Mine in the mid-1950s.

Were there any advances made while you were director, in the metallurgical techniques?

Most of them are small steps. There was one interesting one. Aluminum radiators present a problem, in that it's hard to repair aluminum. You can't solder aluminum. Well, the bureau developed a very inexpensive technique to allow soldering of aluminum radiators and repairing them. Simple enough. One of their major accomplishments involved zirconium. When Rickover wanted to build atomic submarines, it was necessary that the uranium fuel elements be clad in zirconium, and no one in the world could come up with a technique to do that. The Bureau of Mines research center at Albany, Oregon, developed a technique and clad the uranium fuel pellets for the *Nautilus* in zirconium and sent them under the ice cap. Rickover used to fly into Albany regularly, and there are some grand stories about his temperament and disposition. [laughter]

But there were lots of techniques. In safety, the bureau pretty much developed the rock dusting in coal mines. You go in a coal mine, and it's not black; it's white, because in order to keep the coal dust from precipitating in an explosion, the law requires that the mine be covered with limestone dust, which is, first, not injurious to inhale, and second, is not flammable. So what happens in a major mine explosion is that it commonly begins with the release of methane gas where the mining is taking place, and that gas is ignited, and it begins to explode, and that stirs up coal dust as it goes along the mine workings, and then the coal dust precipitates, and you've got one huge explosion. So, if you can keep the coal dust from precipitating, you limit the explosion.

The other trick is to not get the methane ignited. The bureau developed a method for firing, almost exploding, a fire extinguisher at the face of a coal mine. When a mining machine hit methane, and it was ignited, a sensor detected the ignition and fired the extinguisher and put out the flame be-

fore it could start. The bureau ran two experimental mines that developed some of this technique; they are both in Pittsburgh, and that was very interesting work. Television cameras were mounted along the mine openings in the drift, and the explosions were initiated for various studies, and one could see the flame front coming at you and going by the television camera, and then a technique to suppress that would be used, and you could see a little flash when the methane was ignited and then a white powder would squelch it, and that was the end of that.

People would think that the director of the Bureau of Mines would be directing some of the research. You really don't. You're working with the Department of the Interior, with the Hill, with budgets. You do your best, but things change very slowly in a bureaucracy, and you can't be watching all the people all the time. [laughter] So there are things that happen that you may not approve of or that you don't want done; but you're not God Almighty, either, when it comes to the research end, so you do your best to warp it, and I did that, but that's all one can do.

Were there things that you didn't approve of, that you caught and stopped? Can you give an example of that?

Oh, the mining research had done some work in a coal mine in Utah with roof bolts, and quite an extensive research program. They wanted to double the number of roof bolts, wanted to increase the experiment, and tried to sell it to me on the basis that the number they'd first put in were not statistically significant to come to a conclusion, and that by doubling that number, it would be statistically significant. Well, with my work in the NURE program in Bendix, I was semi-expert in statistics. Doubling the sample in statistics does practically nothing. [laughter] I explained that and refused. And they were quite angry. Matter of fact, the

assistant director for mining research quit over that program, but that was all right with me, if he wanted to do that. And the mining company was angry, because there were several hundred thousand dollars worth of roof bolts that had to be put in the mine, and they'd just as soon the government pay for it, but I wasn't going to do that.

One of my failures, an interesting one, was when the Spokane research center wanted to expand a program looking at removing large boulders from an open pit mine. Conveyor belts are a very effective way to move material, but you can't put large boulders on a conveyor belt, and so in some mines there's a crusher in the bottom of the pit that crushes the rocks. This is not done very much, but it's one step. And then, that allowed us to convey the material out of the pit. Well, they were going to build a conveyor that was big enough to take out large boulders. I said, "I can't believe that you can make a conveyor big enough that you can put a five-foot diameter boulder on it." I said, "No. You'll not have that research project."

It was also supported by an equipment manufacturer in Spokane. Two years later I was out to Spokane. They had forgotten what I had said and took me out to a site they had rented, a large lot where this conveyor was. Their test bit was installed, instrumented to a fair-thee-well, and they were so proud of it, that the rocks would go up. They had conveyors that were inclined opposite each other, so one took it up and dumped it on the other, and that took it up and dumped it back on the other, so they could run it around, and they were very pleased. They were so pleased with it that I didn't say anything. There was no point, but it's an example.

Bureaucracy does some strange things. They're all very good people. They're all trying to do their very best. Spokane was another one. For some strange reason, a missile silo became surplus. In the government, when something goes surplus, some

other government agency will get it. Well, the folks at Spokane took this missile silo over. I don't know to this day what in the world they were going to do with it, but they took me out to show it to me and were very proud of it. Sitting at the missile site was a D8 Caterpillar, the biggest Cat made at that time. I said, "Where did the Cat come from?"

"Oh," he said very proudly, "that was surplus in Texas. We got it for five dollars."

I said, "How much did it cost to ship it up here?"

Well, they didn't know, but I know that it was several thousand dollars, very expensive to maintain, and I said, "What do you do with it?"

"Oh, when it snows, we get the snow off the road."

Well, one that was one one-hundredth of that size would have removed the snow very effectively and such. But they lose a sense of money. If they had their own personal finances, it would be different, but it's not their money to spend. It's a problem throughout the government—there's no bottom line, no profits. And if you don't spend all your money, you catch hell from Congress. That happened to me on two occasions when I didn't quite spend all the money that Congress thought I ought to spend, and they gave me hell and said, "If we wanted you to spend less, we'd have given you less." Saving money is not an object of government. [laughter]

What were some of the main issues that you dealt with during the time that you were director, some of the big issues of the time?

Well, the first two years was my survival. [laughter] Jim Watt was the secretary, and he had appointed a deputy assistant secretary, Perry Pendley. He was deputy assistant secretary under Dan Miller, who was the assistant secretary, who was my immediate boss. Jim Watt had been a deputy assistant secretary at one time, and he had Perry

Pendley and another gentleman he had appointed as deputy assistant secretaries, and he thought they ought to run the show, I guess. I never did fully understand it, but I hadn't been there very long before Perry Pendley became a severe problem—for me, for Dallas Peck, who directed the Geological Survey, and for Bob Burford, who ran the Bureau of Land Management. Dan Miller, who is a nice guy, was totally ineffective, and Perry Pendley was, in effect, the assistant secretary, and he was an alligator. He had been on the Hill and had no friends on the Hill and came back. And why Watt had him and gave him the freedom, I'll never understand, but Pendley wanted me to do several things with the Bureau of Mines that I would not do—mainly to do with people. He wanted me to get rid of people. His comment was—and Jim Watt also had this comment—“These people worked for the last administration.”

Well, yes, they worked for the last administration. They're government employees. They work for whatever administration is *in* there. I never understood the bit on either one. Both Jim Watt and Perry Pendley were born-again Christians and advertised it loudly. I never met a born-again Christian in Washington D.C. that had a Christian bone in his body. [laughter] It had nothing to do with Christianity.

Well, the main bit he was on was for me to reorganize the Bureau of Mines, and no matter what I did, I could not meet his reorganization bit. Meetings that I held, the news got back about whatever I discussed in the meeting before I could even get back to my office, and I discovered it was John Morgan, who was the senior staff officer in the Bureau of Mines, a man of great standing and a tremendous survivor in the Washington environment. He and his secretary had a code word, so that if Perry Pendley called, John's secretary could come tell him in my presence without my knowing that it was Perry

Pendley calling. It became more and more difficult to work with him.

Watt was busy running around. Watt would rather argue than win, I guess. Looking back on it now, I think he must have developed a tremendous ego. He was very proud of the publicity he got wherever he went. He wasn't accomplishing anything, outside of lots of publicity for him. Environmentalists hated him. The more they hated him, the more he loved it. And he was paying no attention to the Department of the Interior. I never met with him to discuss anything. [laughter] Never. Well, I'll point to a picture on the wall over here.

So we are looking at a picture with Jim Watt and Don Hodel, Secretary of Energy?

Yes, Hodel had been the undersecretary working for Watt. Watt was out of town so often that Hodel commonly appeared for Watt at cabinet meetings, and Reagan became taken with Hodel, who was a real quick study. When an opening came in the Department of Energy, he appointed Hodel as the Secretary of Energy. Watt had staff meetings every Monday with the political appointees to talk about what was going on, and every Tuesday with the political appointees plus additional staff. The Tuesday meetings always started with, “When you weren't here yesterday,” talking to the staff people. “So this is what we discussed yesterday.” I never understood the purpose of the second meeting, and the first meeting was largely a waste of time, but looking back again, it was a chance for Watt to advertise his presence or whatever he was going to do. They were full of rah-rah talks and high school sort of things.

All of us got the chance to have our picture taken with two secretaries, Watt and Hodel. Watt, in particular, thought that would be some coup for everybody to have a picture with both the Secretary of the Interior

and the Secretary of Energy. After this picture was taken I went back to Dan Miller's office, and Dan Miller said to me, "They want your resignation."

Now, I didn't ask him who "they" were. I knew the ones he was talking about. I assumed it was Watt and Perry Pendley. They had the resignation all written out. I've always been kind of a team player and easy going. [laughter] I would do things quite a bit differently today, but I signed the bloody resignation. Two days later I met Watt walking through the hall, and Watt said to me, "Oh, if it's any consolation, Bob, I didn't ask for your resignation."

I was so taken aback by that comment, because he knew that I had no response. I still don't understand that. He went with Perry Pendley? Well, I went back to my office, thought about it a little bit, called up the senior members of the bureau—because certainly the news was going to get out real quick—and had them come in. All of them, with one exception, were quite upset. Herman Enzer, one of the top staff people, said, "You're the best director we've ever had." He was very upset, as were the others.

Not John Morgan. John Morgan said—and I remember to this day—"Now, fellows, we've had directors come and go before." John Morgan knew about this request long before I did.

Well, a fellow was there, Bruce Carroll, who was from Las Vegas, who came back with Bob Broadbent to the Bureau of Reclamation. I don't know that Bruce knows it, but for some reason Bob didn't want him around there any more, and it wasn't uncommon for me to have the dregs dumped on me. Somebody they didn't want some place, they sent over to the Bureau of Mines for me to work with. Well, Bruce Carroll came over, and he was a rather sharp character, had been in personnel management and so on. He came in, and we talked for a little bit.

One of the requests was that I move immediately out of my office over to Interior. He said, "Don't do that." And I calmed down a little bit, thought things over, and so I didn't do it. I learned very shortly that Perry Pendley had made some very serious errors, and Watt, too. Before you ask for anybody's resignation who is a presidential appointee, you'd better touch base first with the personnel office in the White House. You better touch base with the senators from the guy's home state, in this case, Paul Laxalt. And none of that had been done.

Well, long story short, I sat for two months, and the phone didn't ring. No mail came. [laughter] I don't know where, when, or what happened, and I was getting advice that, "Bob, you're going to ruin your political career."

Well, I didn't have a political career in mind, anyway. And Ed Allison called me up one day. Ed was the administrative assistant for Paul Laxalt. Ed and I had been friends for a long time, and he said, "Paul and I are meeting with Watt tomorrow about you."

Oh, I should drop back a little bit. Ford B. Ford, who was with MSHA, had been with Reagan in California. Initially, he owned a Coke franchise in Bishop, California, but he became head of some safety outfit in the state of California, and was one of Reagan's people that went back to Washington, D.C. Every so often, we would be invited to the Old Executive Office Building for a briefing by somebody high in administration: Ed Meese, rarely the president, but occasionally the president. And a meeting was called about halfway through this resignation process. So, nothing else to do, I wandered over to the Old Executive Office Building, upstairs to the room where they had these briefings, and Ford B. Ford was there. We said hello, and he introduced me to three other people, whose names I don't recall, and the four of them started talking about the Horton affair—as though I wasn't there! I don't know

if they hadn't heard my name or whatever, but anyway, the White House was very interested in what was going on, and they were all watching this with great interest, because they were sure that Watt wasn't going to win this one. [laughter] I thought, "Well, that's interesting."

I'm sure Ford was having his oar in the water there, too. Anyway, Ed Allison called me up and said, "We're meeting with Watt. Tell me, write down all the questions he's going to ask and the issues he's going to bring up and your answers."

So, I sat down, and I filled up about five or six long legal pages with questions and answers. At this moment I can't think of a single question or issue or whatever it was, but there were some, I guess, differences I'd had with Perry Pendley. That mainly would be it. So, I took those up and gave them to Ed, and a few days later he and Paul met with Jim Watt to discuss the Horton issue, because it became an argument between the senior senator from Nevada and Perry Pendley, a deputy assistant secretary low dog. And this wasn't going to happen. [laughter]

Well, Perry Pendley was in the meeting, and Allison told me, or I heard later, that when they got done, every time Watt or Perry would bring up something, Allison had the answer. [laughter] And Perry said, "Who was that guy?" [laughter]

So, Ed then called me up and said, "Watt's going to give you a call for a meeting. You go over there, Horton, and you be humble. You be humble like you've *never* been humble." [laughter]

"OK."

So, I went over, had the meeting. I was humble like I've never been humble, and Watt went up and went down, "I've been rolled by Paul Laxalt." Paul Laxalt got him the job in the first place. It was Paul's recommendation and backing that got Watt the job as secretary. So, when it was all done,

he said, "Well, consider your resignation withdrawn," he said, "but you're in charge of notifying the press," because by now it was in mining publications and such, and I was getting a lot of support from the mining industry, bless their hearts. They were calling Watt and writing letters and calling Reagan, and state geologists were doing the same thing. I had a lot of friends.

So, Watt said, "I don't know how you're ever going to straighten this mess out. You shouldn't have said anything to anybody in the first place."

With my resignation, the first bit I had said was, "Personal problems require that I return to Nevada." I went back, and all I then said was, "I've been able to resolve my personal problems." [laughter]

That made a total change in my relations with the Department of the Interior, because nobody wanted to go through this one again. Once you've won one, they kind of stay loose, so life got a little better. It wasn't too long thereafter that Watt got in trouble with the White House. Well, first of all, on a Fourth of July he banned the Beach Boys, which happened to be Mrs. Reagan's favorite singing group. [laughter]

The Department of Interior runs Washington, D.C., cleans the parks, you know. Park Service runs everything, handles everything there, and so the Interior is responsible for what goes on outside of the buildings in Washington, D.C. So, that got him in trouble. He made some strange statement one time—I can't remember exactly. I guess it had to do with the Beach Boys. Maybe that was it. He backed out of that. Because they called him over to the White House one time. They gave him a cast of a foot; it was painted gold with a big hole in it. And they said, "This is the Hole-in-the-Foot Award. You go out and talk to the press," and shoved him out into the press. And that's all. He'd had no preparation or anything else, trying to explain how he'd screwed up.

The hole in the foot, like you'd shot yourself in the foot. Is that right?

Yes. And then, in a speech in late 1983 at some press conference, some reporter took him to task for his appointments, or somehow he got taken to task for appointment on a particular committee. And he said, "I don't know why they're so upset. I appointed two Jews, a black, and a cripple."

And what got him was the word "cripple." It was a word America doesn't use anymore. The "Jews" was all right, instead of two "Jewish types" or something. I don't know if he was asked for his resignation or whatever, but anyway, he resigned.

Reagan appointed Judge Bill Clark as Secretary of Interior then. Bill Clark had been a supreme court justice in California, was a very close confidante of President Reagan and an extremely capable man. He had gone around the world several times for Reagan to hot spots and handled things quietly. He came over. I was surprised that he did, because I thought there'd be somebody of lesser stature that would come over. But he came over, and the first thing he did was fire Perry Pendley and the other gentleman, whose name I can't remember, who was the Watt's bit.

I was in Reno for Christmas vacation, and the phone rang. I had met Bill Clark earlier. About every six months Watt would have a meeting outside of town, just a retreat, which was a good idea. The first retreat was just presidential appointees, and we had some great discussions. His staffers, then, as staffers will in Washington, D.C., bitched about not being invited, and pretty soon, instead of thirty people, it's two hundred people.

At the time of Watt's resignation he had a meeting scheduled in Williamsburg. He wanted to meet there. It all happened within a day or two, and Clark kept that meeting. So we all went to Williamsburg, and at the

same time, Perry Pendley's name had been submitted for appointment as assistant secretary. Dan Miller had left, and so Watt had submitted Perry Pendley's name. The day that we left for Williamsburg there was a vote on the Hill on about twenty-five or thirty presidential appointees, including Perry Pendley. The word came down to Williamsburg that all had been approved. Dallas Peck and I both got there about five o'clock, heard of Perry Pendley's approval, went up to Peck's room, and immediately got drunk. [laughter] Almost, not quite. We came down for dinner and walked by a table where Perry Pendley was sitting, and somebody was congratulating him on being appointed assistant secretary. He said, "Oh, there's been a little mix-up in D.C., but it will be straightened out tomorrow."

Well, the little mix-up was that his friends on the Hill, who didn't like him any better than I did, and some senators, too, had refused to approve Mr. Pendley. Bill Clark had also had his finger in, and so Pendley was fired and sent upstairs, where there were some offices on the top floor of Interior, kind of in the attic. He had a week to get his act together, and then he was to be out of there. There's a nice postscript, "to be out of there."

Well, the White House personnel office—if Reagan had an idiot outfit, it was the White House personnel office, run by a man named John Harrington. He's a real estate fellow from California, who later became Secretary of Energy, and Hodel came back as Secretary of Interior, but Harrington was there. And so, they decided to take care of Perry Pendley and send him over to the Defense Department. So they called up the person in charge of political appointees—as opposed to presidential appointees—in the Defense Department, and this lady told them, "No. Absolutely, no way."

Well, the lady was the administrative assistant for Casper Weinberger, who was the Secretary of Defense. And the lady was

Marybel Batjer, the daughter of Cameron Batjer, former supreme court justice in Nevada, my very close friends—my girls and his girls grew up together, kind of. Marybel knew about Perry Pendley. [laughter] And they laid the pressure on her. For two months she kept Perry Pendley at bay while the White House personnel office worked on her. Finally, they sent him around her to an assistant secretary of the navy for two weeks where his job was to read the *Wall Street Journal*, and then he left.

He ended up at Watt's old job. He is now president of the Mountain States Legal Foundation. And he's just the perfect alligator for that, and back fighting environmentalists. [laughter]

That bit was for two years a true headache for me. I was trying to keep the Bureau of Mines afloat, while they were trying to sink it. Reagan had promised to reduce the staff of Washington, D.C. government employees. Well, it didn't happen, except with the Bureau of Mines, almost. Watt was working on it. The Department of Interior bureaucrats did not like the Bureau of Mines. I don't know why, except maybe that it didn't do governmental things. It did research and information, and didn't enforce any laws and so on. So, it was always a fight for the budget and for our staff ceiling. One day the new budget, the amount I'm supposed to shoot for, comes over along with a staff ceiling. And the Bureau of Mines with 3 percent of the population in the Department of the Interior was asked to take 20 percent of the manpower cut of the Department of the Interior. [laughter] That's the one time I had a good argument with Watt, and he backed down and agreed, and we only ended up taking 8 percent of the cut, but we always absorbed more. I started out with the Bureau of Mines, had 3,300 employees, and I ended up with 2,100 employees, cutting the staff and closing research centers.

My evaluation was that the mineral information part was essential for the

government, as well as for industry. And for the world as well—the world depended on the Bureau of Mines mineral information statistics, so you had to keep that.

Well, advancing a little bit, Judge Clark is now Secretary of the Interior. And I read in the paper, the *Post*, talking about it, that he had been born in Manton, California. Now, do you have the vaguest idea where Manton, California is?

I'd mentioned way back when that my father was trying to develop a public power utility in northern California. In the course of that he made friends with the Forwards, a family that lived outside of Red Bluff, California, near Manton. As kids we would be up there, and I knew where Manton was, the only one. The Forward brothers had a sawmill there. I asked Judge Clark one day, "I see where you were born in Manton. Do you know the Forward brothers?"

"Do I know the Forward brothers? I worked in that damn sawmill all the way through high school and half of college."

So, that kind of got a little tie for us. He is a very rational individual, one of the nicest people I ever met, and most effective. We never had another staff meeting all the time he was there. He just stopped them all. But things ran like a business. I was back home again. [laughter] I was working with logic. And that was lovely for the day.

There were cuts in your personnel. Were there Nevadans who were employed by the U.S. Bureau of Mines?

Yes. Oh, yes.

What percentage?

Well, there were two Bureau of Mines installations in Nevada: the Reno research center and the Boulder City facility. It wasn't called a research center. I forget the exact title it went by now. It had been established in the 1930s to come up with electro-chemi-

cal mining and metallurgical methods—mainly metallurgical methods—that would utilize electric power. Boulder Dam—Hoover Dam—was going to generate this vast amount of power, and a lot of it surplus. How could it be used in the mineral industry? That's the station where some of the early titanium and magnesium work was done. The Boulder City facility was a satellite of the Reno office. For administrative and budgeting purposes it operated through the Reno center.

I visited it a couple of times. It had done great work. The Nevada senators had fought hard to keep it in place, and Senator Bible, in particular, was very proud of the Boulder City station, but we couldn't afford it anymore. People-wise or dollar-wise, we had to start trimming, and that was the first rational place to trim, so I closed the Boulder City station. Watt gave me one of his rare compliments. He said, "I don't know how you did that." One day when I met him in the hall he said, "How did you close the Boulder station? I didn't get a single phone call or letter from anybody—no senator, no congressman. How did you pull that off?"

I said, "Oh, we Nevadans stick together." [laughter]

So that impacted that area. There were several of them that were ready for retirement. The people could retire, or we offered them jobs in Reno or at other stations to absorb them all. Not all of them took advantage of that, but some did.

You just said something important, "We Nevadans stick together." Is that true in Washington?

Yes, it was. It was. In Washington, D.C., every state has a society. There was a Nevada Society, and it would meet, oh, maybe every six months or every five, kind of irregular, but we would all get together. With Paul Laxalt there, he had been effective in getting quite a few people appointed in vari-

ous positions, and that was recognized in D.C. So we collectively swung a little bit of weight. Paul, being very close to Reagan, swung a lot more weight than any other senator might have.

So there was really a camaraderie and a sticking up for each other?

Yes. There was one other event. Paul had an affair every March, I believe it was, a black tie affair at the Georgetown club—very, very, very exclusive club—to which he invited all the Nevada political types in D.C. and senators that he wanted to invite and the President. Out of the six years I was there, I went to six of them, and with one exception the President was there every time. There would be about fifty people. Senators and congressmen fought for invites to this affair. At the first one I sat at a table. There were, I think, six of us—one at each end and two on either side—and the gentleman sitting next to me was John Glenn, Senator John Glenn. I thought, "Gee!" I was excited. "This is going to be something. I'm sitting and talking to John Glenn." I never talked to a duller man in my life. [laughter] Now, whether he was having a bad day or wasn't interested in me, I don't know. That might have been it. It was not a lively conversation. It wasn't at all. The first meeting was held before the President was shot, and first you'd get a written invitation to the party, and then a note would come a little bit later that said, "Because of some parking problems, be there by 7:30." Well, the Secret Service wanted you there by 7:30, because the President was going to show up a little after 7:30. So we were all there, and then the Secret Service and the President and his consorts would come in.

After he was shot, they erected a large tent at a side door, and his car could pull into the tent where nobody could see him, and then he would get out of the car and go in. That's the way they protected him after

he was shot, and that happened at all the affairs.

The President always said a few words, but left a little early in the evening, so the carousing went on. At the last one he was at he said, "After I get out of this damn office, I'm going to come back here and find out what you guys do after I leave." [laughter] But that brought Nevadans closer together and gave us some familiarity with some of the other political types, though I met with many of them, anyway.

When you are going to be a presidential appointee, it's with the advice and consent of the Senate, so when you first get there, before your Senate hearing, you go up and meet with the senators and congressmen who might be interested in it. When I went back there I was innocent as innocent could be. Fortunately, the Republicans controlled the Senate, because I went back and bought a townhouse before I'd ever been confirmed. You wouldn't do that today, but it seemed to me that it was going to be automatic, and it was. It was.

Jim McClure, Senator McClure from Idaho, was the head of the Senate committee, Interior, I guess, that held the hearings. There were only one or two other senators that even showed up. Most hearings in Washington are very dull. They only all show up when the TV cameras come in, and they can ask questions for the TV. Otherwise, the chairman is there and maybe one other guy briefly, but they're fairly routine. [laughter]

So, the day came for the hearing. By the way, I'd gone back a month early and had gone into the director's office. My secretary, Becky Renner, who had been there forever—she'd been the director's secretary since 1955—would not allow me to do any director's things, because I had not yet been sworn in. She was right, but she was very protective of me, always. After I'd been there a month, she came in one day and said, "Mr. Horton, you know, you don't have to have

me as a secretary. You could have anybody in the Bureau of Mines that you wish."

I said, "I'm not insane, Becky." [laughter] She knew Washington D.C. upside down.

I might be frustrated some day, trying to get hold of somebody, and nothing working, and then Becky would finally say, "I know his secretary. Would you like me to give him a call?" [laughter]

Interesting, very nice lady, and sharp, confidential. I was sitting in the office one day with nothing to do, and I had a beautiful view. I was in a building that the government rented on the tenth floor. The building next to us was the Watergate, and I could see over the top of the Watergate. The Kennedy Center was right here. Across the Potomac River was the Arlington Cemetery, the Marine Memorial, and the Iwo Jima Memorial. Pentagon was down there. I had the most beautiful view in all of Washington, D.C. I was sitting at my desk, staring out the window, didn't have a darn thing to do, and I heard somebody walk up to Becky and say, "Is the director busy?"

She said, "The director is always busy. What do you want?" I almost blew it. [laughter] But that's how she took care of me.

Back to the hearing, then. The hearing comes, and there was Dallas Peck, who was director of the Geological Survey—we became very close friends—and a fellow from the DOE, who was going to be an assistant secretary (I don't remember his name right now), and me. McClure called the hearing to order. Standard procedure was for the senator from your state to show up and tell the world what a nice guy you were, but Paul must have been busy. Other than that, he sends a letter, but he didn't do either one, and McClure was embarrassed for me. You submit a resume, of course, and other documents, so McClure did his best, nice and quickly, to give a little speech about what a nice guy I was, before they had the vote in the committee. I think I was second. I think

no one showed up for Dallas Peck, either. Tradition with the survey was that a career employee become the director, and Dallas had been a career employee. He was initially from Spokane, Washington, but had lived in Virginia for years. I don't recall anybody showing up for him, but anyway, it went tick, tick, tick. All formality. The next day the Senate voted on it, and the day after that I was sworn in at one of Watt's staff meetings, just so I could get to be director. About two weeks later there was a formal invite sent out for my swearing in ceremony and so on, and that was interesting, too.

The Bureau of Mines had not had a director since 1975. There had just been bureau people working temporarily. Nobody in Interior cared enough to get them a director, I guess. So there was quite a void, and people were very interested in who this new director was. So I was getting visits by mining types, and as I mentioned, visited on the Hill with lots of different people, just to say hello and let them know we were out there. They're all very nice in their offices. They're bastards on the floor, but they're nice in the offices.

There's a large auditorium in the Interior building, so that's where this swearing-in was held. There are a couple of pictures up there. The stage is up at the front, and you come in from the back, from the main entrance of Interior. Watt and I walked in together at the back, and it was full! There must have been 200 people there. Watt said, "My God! There weren't this many here for me." [laughter] He was a little upset, generally. So, I got sworn in, and then there was a reception upstairs in another large room and pictures of that. So that was all very nice. This innocent kid from Nevada.

You'd never been in Washington politics before?

No. The bureau had very good relations with the Hill. I didn't get much in the way of

any problems with the Hill, except they slowly developed. I never understood exactly why, some with Jim McClure. A vacancy occurred in Spokane for the research center director, the guy that's going to run the place, and so we advertised for it, and I had an excellent candidate that I wanted to appoint. When the dirty work is done, you didn't ever hear from the senator. You heard from the staffers. McClure had a man he wanted appointed and insisted that it be so. He and Hodel, who was secretary at that time, were good friends. They met once a week for breakfast, because McClure was still chairman of the Interior committee up there. I had no choice. I had to appoint. I let it be known that I wasn't all that happy with it, and then I got crossed swords with a Bill Mott, who was the employed head of the Northwest Mining Association. I never quite understood what that was all about. I don't to this day. I'm jumping ahead.

When you finally leave, it's mutual, I think, which I finally did. A large part of looking back, it's mutual dissatisfaction. When you finally resign, you've made enough people angry. The average presidential appointee lasts 1.4 years. I was the third longest serving Bureau of Mines director in history. They just don't last very long. The congressmen and the senators report to nobody. They don't have any bosses, but they are all your bosses. [laughter] All of them.

I was there six years, from September of 1981 to July 4, Independence Day, of 1987. You can't do what they want you to do. A senator from Pennsylvania wanted me to continue funding in a mining amusement park in Pennsylvania, which was named for him, and I said, "No. It's not the Bureau of Mines' job. Go get your money elsewhere." He just had hidden the funding in the Bureau of Mines budget, and I said no. There are things you can't do, but the Hill doesn't understand that you can't do it.

There's familiarity after awhile. Stennie Hoyer, a congressman from Maryland, get-

ting to be a big bird back there, complete idiot, for my money. The building we were in had to be renovated. There were fungus problems with the air conditioning system. They were afraid of Legionnaire's Disease, so the bureau was going to have to move. Stennie Hoyer insisted we move out to a building in Maryland that a large contributor of his had vacant, out in the middle of absolutely nowhere—no bus service, no subway service, no nothing. I said no. I also closed a research center that was in Maryland, Avondale Research Center, which was running out of money and people. I had to close it, and that didn't make him happy. There weren't all that many people that became unhappy.

What were the successes that you feel like you accomplished during your time there?

I got computer operations straightened out. The accounting system had fallen apart shortly before I got there. The accounting system was in disarray. Management ran the personnel office, payroll, and the accounting. The accounting was done on a computer in Denver, Colorado, because Congress had passed the resolution saying government's getting too damn many computers. No more computers in Washington, D.C. So the Bureau bought one and put it in Denver, Colorado. [laughter] So, that's where the accounting was. The head office is in Washington D.C., and the accounting is out there.

This was back in the late 1970s. Probably too many computers were being bought. Everybody and his brother was probably buying these computers, and Congress said enough's enough. So they came up with that. Well, Walt Lander had been the head of it, and they advertised for a new position. They expanded it slightly, changed the job characteristics. You play games in D.C. on personnel, because it's very touchy about what you can do and what you can't do under the Civil Service Act. Anyway, they hired

a lady Ph.D., former nun, who became my headache. [sigh] Bernita was totally ineffective. She spent all her days writing memos to cover her actions. She had favorite people that she tried to promote rapidly and others who she hated. She either loved people or hated people, and I was doing my best to get her straight. She was intelligent enough. I don't know where this came from.

One problem that came up immediately was that she had a young man working for her who was also going to law school, and she had promoted him from a GS4 to a GS9 in about six months. Well, you can't do that, but she just ordered it done. Somebody complained, so there's a government-wide personnel office, the Civil Service something-or-other, and they came over to see me and said, "This has been brought to our attention, and it can't happen. You have to demote this young man."

So I called this Bernita in and explained it to her, and then the young man to explain why he is no longer a G9. He was a nice enough guy. I thought I understood him well. I made the mistake of saying to him, "Let me take off my director's hat and just speak to you like a father. You're just getting started in the government." Oh, this was because he was going to sue, because of this reduction. Well, the board is coming in—a Merit Review Board, and he was going to sue the bureau and the government or whatever. I said, "You don't want to do that. You're just getting your law degree. You're just getting started."

Well, in some later testimony, he said, "Yes, and Horton said, 'Let me take off my director's hat and talk to you like a father,'" which came out all right. The poor guy. Before the suit came up, he was arrested in the men's room of a supermarket for soliciting young boys, and three weeks later died of AIDS.

But I still had Bernita's voice. She got angry with the people in Colorado. We were having problems with the accounting pro-

gram. I smile at the Nevada Department of Motor Vehicles.

With their new computer that we're hearing about today?

Yes. I won't be surprised to know how it happened, same way the Bureau of Mines got theirs. They developed a new computer program, switched on to it without keeping the old system going, and it was a mess. They had hired computer people who knew nothing about accounting to write this program, and had accountants that knew nothing about computers that directed it, and off they went. There was no audit trail. You couldn't find any intermediate numbers. This went in, and that came out, and you don't know how the hell it ever happened. It was falling apart.

Now, Bernita got mad, went out, and started transferring people. These were Senior Executive Service. Now, the Senior Executive Service was sold to federal employees by, "We're going to treat you just like industry. You'll be promoted. You can't be fired. You're going to be senior management, but you'll have to agree to go where we really need you."

"OK."

So, the way you got rid of a Senior Executive Service guy was to send him to some place he didn't want to go. [laughter] Well, she started transferring the head and the second head and the third head out of the accounting bit. I'd been out there and met them all. They were trying to get the bloody thing straightened out, and there was no backup. I picked up the phone one day, called Denver accounting, and no one answered the phone. So I called her up and ordered her back to Washington, D.C., had a big argument with her. She was going to sue everybody else and such and such. Finally, the guy in personnel over there, who owed me some awful great favors, took her

off my hands and got her over into Interior, and I got another fellow in.

What happens in government, though—I mentioned the name Walt Lander; I approached him, because he was working for John Morgan all the time I was there, but he had a suit on to be reinstated as management, which he had done a terrible job on. After I left, the case came before a judge, and the judge ordered that he be returned to that position, where he was incompetent. He was appointed back by the judge, and the judge had no responsibility for it. Another example of idiocy run wild. [laughter]

Generally, the people in the bureau were fine people, but there were some strange exceptions. The lady was Bernita Joyce, Dr. Bernita Joyce. I wish her well, but she sure was a headache.

Among your staff in Washington, were there Nevadans?

No. They'd all been in Washington for a long time. Nevadans were here in the Reno research center.

It sounds like a lot of your work was administrative.

Yes. Budgets. I had a budget office. Now, what do I need a budget office for? In Bendix, once a year I had to submit a budget. We got the budget and moved on. Well, in Washington you've got the budget you're spending; the budget you're working through Interior that you're going to defend before Congress; and the budget after that, which you're trying to get started writing up. So you got three budgets going all the time—drives you right up the wall, and everybody in Interior and the Office of Management and Budget is an expert on what you ought to do. So, when you get done it's a camel put together by all these idiots. You think you run the Bureau of Mines? No. You send it over to Interior,

and it goes to the assistant secretary, and he's got a budget weeny there, that you start having fights with. I said, "I thought the President appointed me to run the Bureau of Mines."

"Well, maybe he did, but this guy's running your budget." And that's the way it worked. [laughter]

Then I'd go over to OMB, and then I'd fight with OMB. It would always get cut down to about \$105,000,000, and then I'd have to go up and defend that before Congress. The first time around I couldn't believe the Bureau of Mines. The senior staff members ran me through one practice session after another, of going through this budget. We finally went up, and the chairman of the appropriations committee, Interior bit, that worried about the Bureau of Mines, was Congressman Sidney Yates, in the House, former prosecuting attorney from Chicago. He and I sat across the desk for seven hours, going line by line by line through the budget. I don't know how he maintained his sincerity through it all. I was sweating bullets and doing my very best to answer all his questions. I was backed up by some staff, so occasionally I could turn to them, if I didn't know it, but mostly I knew it. Just in detail, detail, detail. He'd regularly say, "Mr. Horton, don't you care about the lives of the American miners, with this ridiculous budget?"

I said, "I have to say, Mr. Chairman, in the opinion of the President of the United States, this is the appropriate funds for the Bureau of Mines." That was it. No point arguing. That was it. It was Reagan's budget I was defending. On we'd go again, and then the same answer. The second year was almost as bad. The third year got a little bit shorter. The fourth year was a little shorter. The fifth year he didn't even show up, and the sixth year was fairly brief. He got tired of me.

But the Senate was just automatic. Just walk out. I can't even remember a hearing. The budget hearing in the Senate was just

tick, tick, tick. Why was Yates so interested? Yates is also the main leader for the National Endowment for the Arts, and he is extreme on that bit. I never met with him in his office. He refused to meet with you outside of the hearing room. It was a strange arrangement, but it was interesting.

So, what percentage of your time was just doing the budgets?

Twenty percent, possibly. Getting ready, arguing with it, trying to find out how you spend it right. Our budget was unique in the federal government. I don't know how it got started, but all our appropriations were "until expended." Usually, the appropriations are for the fiscal year, but any money we had, we could carry over. We always saved a little bit. Twice while I was there, Congress failed to pass the appropriations on October 1, which is the fiscal year. They changed it from July 1 to October 1, so they'd have time to get the budget done—didn't do a damn bit of difference. They didn't have the budgets, so government had to shut down, but not the Bureau of Mines—we had money. [laughter] Made the employees angry, but we had the money to keep going, so I didn't shut it down.

I was mentioning the funds. One great memory is about a senator from Idaho, whose name escapes me right now, who was running for re-election. He was not too much of a senator, but he needed some help. Senator Warner, Jim McClure and Larry Craig, who was in the House of Representatives at that time, decided they'd have a hearing in Idaho with this other senator there to give him some good advertisement. Well, administrative people never leave Washington, D.C., for a hearing. Otherwise, these guys would jerk you all over the United States, but in this case they needed some witness, and so I don't know if it was Larry Craig or Jim McClure who said, "Bob, would you?"

So I went up to be the administration's witness, give them some reason for this hearing up there. Well, I met Warner. He was on the same plane—nice guy. We rode out together to Coeur d'Alene. So everybody's friendly. Nice party the night before. Good old Bob, he's here for the hearing. So we go and sit down, and I'm sitting here, and the four of them are up there, and they take off. Well, it's Coeur d'Alene, Idaho, a big mining community up there. I'm getting chewed up one side and down the other. [laughter]

"Why are you doing that? Why are you doing that?"

The one I will never forget was Larry Craig, who I knew very well. He looked at me and said, "And Mr. Horton, if you come up to Congress *again* with all those stupid budgets, we're going to ram more money down your throat." [laughter]

"Don't throw me in the briar patch." That was hard to keep from grinning.

But they finished the hearing. They got their publicity. Everybody was friends afterwards. [laughter] They performed for the cameras, or performed for the audience.

Did that performance have anything to do with the local versus big government kind of antagonism?

Yes, and I would suppose they were being the local, and I was the big government. I didn't think of myself, hardly, as big government, but yes.

Did you run into that in other places?

Not with the Bureau of Mines, particularly. The mining industry knew the Bureau of Mines well enough so that there was some of that. This seems strange to say, but I don't think I ever appreciated that I had a pretty high position, you know. I was called the Honorable Robert C. Horton and such, but I don't think that ever went to my head, and I never made much of it. I certainly appreci-

ated having the experience and the position, but I don't think I ever tried to be a big shot about that. I am not built like that.

You asked about people on the Hill. I had been there but a short time when we were invited to give a presentation on the Hill on the Bureau of Mines research activities—kind of unusual. Every agency has a congressional liaison officer that works with Congress, and they are finding out what Congress's interests are in the bureau. A bill comes up that affects the Bureau of Mines or mining or something, and they'd get the information. They're your contacts. I had some pretty good people—a man to start with, and then two ladies later on, who all were very, very good at doing that, and I'm sure they helped set up that meeting. Anyway, I hadn't been there very long. Watt's still suspicious of what I'm doing, and Perry Pendley and I are already having a fight. We had this meeting on the Hill in a fairly large conference room, and we've got slides, and I'm up in the front as the chairman. The screen's over here, and the front door is there, and people—mostly staffers—come, but that's fine because the staffer is the one that talks to the congressman, and there are various people in the Bureau making these presentations. The door opened, and in stepped Mo Udall, and he looked over at me. I'd met with him briefly, didn't know him too well at that time, and he said, "Mr. Chairman, may I have the pleasure of the floor?"

I said, "Why, certainly, Mr. Udall."

He spoke for twenty minutes on the glories of the U.S. Bureau of Mines. I couldn't believe it—telling these staffers what a great outfit this was. Now, Watt had two guys sitting there to see how I'm going to stick it to the Department of Interior or something. When I got done they said, "How did you arrange that?" [laughter]

Didn't have a darn thing to do with it. From that moment on, Mo Udall and I were good friends. He signed the picture up there very nicely. I wasn't unique. I think I men-

tioned before that he probably was the best-liked man in all of Washington, D.C., a very honest, straightforward, fine individual. Great comedian. Telling jokes that would never stop at various meetings.

I went to one hearing in the House, not too long after I'd been there, and it was before Weaver, a congressman from Oregon. I think it might have been a House science committee. I'm not too sure. The Forest Service was giving a presentation, and I was to give a presentation. The Forest Service was first, was just lining up. Barbara Vucanovich had just been elected, and I've known Barbara and George for a hundred years. Barbara came in—this was one of the fancy committee rooms—came around the top, looked down, saw me, and came directly towards me. I hadn't seen her in D.C. at all, so I stood up and Barbara came over, grabbed me, and kissed me. The Bureau of Mines guys about died. They'd never seen the director kissed by a representative. Weaver had given her a list of very nasty questions to ask me. He came over and ripped that list up, ran, went back and sat down. [laughter] He was later indicted; he did some fancy things with campaign money or something. Anyway, he'd failed that bit.

More signs of Nevadans who stick together. We were interspersing people on the Hill with successes you had, and you talked about fixing your computer problem. Other successes that you want to talk about?

Well, one I tried, and I kept using, but it was half a success from my part. We would get questions from Congress or industry, "What do you do in a particular field of research?" One I can remember is, "What research are you doing in copper?"

And so, I called up the assistant research director in Washington and said, "What research are we doing in copper?"

He said, "Well, we'll get back to you. We'll have to call the research centers."

"You mean, you don't watch what your research centers are doing?"

So, the answer came back, and I said, "We're going to put together a little computer program here, and we're going to have it list all the research programs."

So, we worked and worked on it. You always had some contractors in there writing the software—you had to write software in those days. They finally get the program all put together, and I had a computer in a little side office of mine, so I could go in there and look. If I wanted to run up copper or something, I could. So I got that much done. I tried to get dollars on it. They're always very reluctant to put dollars on.

The main reason was that I wanted activities and accomplishments, you know, a research schedule. You've got to fight with research types. They hate schedules. But you got to schedule, and so I would fight to get the scheduling done. I was still in the process of that, and January 1 came up, and I walked in and flipped on my computer. The screen is blank. There's nothing there any place. The data is gone. I called up Dave Forsey, who was the mining assistant director. I said, "What happened to the data?"

"Oh, Bob, it's a new year. We're starting over again."

They reentered the data, started the New Year, as such. Really had no idea of scheduling or whatever. The importance of staying on a schedule, and if not, have a reason to get off the schedule. That's fine. In Bendix, that's how we got the job done. We set some schedules, and we stayed with them. That was truly lead, follow, or get out of the way. [laughter] I fired some universities, and I fired some U.S. Geological guys. Guys that couldn't cut it, I gave them one month. I told them they had one month. At one month, if they didn't have a month's work done, they were gone. They had three weeks done, they were gone. [laughter] That's the only way we got the job done.

You've got some more to tell about successes.

One had to do with production, but was the requirement to downsize the Bureau of Mines, which was directed by the Department of the Interior, OMB, and also the Hill. The budgets were reduced; costs were going up with inflation; and the number of people I was allowed to employ was decreased. So those were the ceilings I had to meet. To do that, I had to close some facilities. I mentioned first closing the Boulder City facility. Well, the Bureau of Mines population was kind of a strange grouping. It was mostly people over fifty or under thirty-five. There was a gap in there. I'm not sure I know why that was. I wasn't hiring very many. So there weren't a lot of young people in there. A lot of them were eligible or close to being eligible for retirement. We never laid off anybody—just the normal loss through the year accomplished the goals of getting to the people, but I was ending up with organizations that were sorely understaffed and were costing a lot of money just to maintain the physical plant, so that didn't make any sense. You had to close the physical plant and move the people. So that's what I was doing. I closed several small activities.

One led to an interesting affair. There was a field operation center in Pittsburgh. These were geologists that looked at mineral resources and mining operations. The one in Pittsburgh didn't have a lot to do, and it had about twenty people, and I couldn't really see any reason for them being there. Sheer inertia had kept it there, and so I had to look at it, and I decided, "Let's close this." We offered everybody a transfer to Spokane or Denver. A lot of them took it; not everybody did.

Not too long after that, I received a threatening letter in the mail from someone who was going to come in and kill me. I had never received one quite like that before, but it upset some of the bureau security people,

and they ended up with a guard outside the door for awhile. I was quite certain it was a disheartened person from this field operation center. Well, if you're not supposed to threaten president's appointees If you threaten the President, you get in trouble real quick. You threaten the director of the Bureau of Mines, nothing much happens. [laughter] The FBI was on it, but doing absolutely nothing, and the letters kept coming. People became more and more concerned, as if he's going to carry this through, but I didn't read the letters as being that.

The last letter that this gentleman was able to write had some strange phraseology in it. John Murphy was the head of the research center in Pittsburgh—sharp, sharp guy. I sent the letter to him, and I said, "John, there's some phraseology in here that has got to be unique to this individual. See if anybody recognizes it." And they did. John told the FBI, and the FBI picked up this guy. He was a foreman, and he was a geologist that was certain he would do consulting in Pittsburgh, and he didn't. He didn't have a job. He had a family. He'd go out and get drunk and then write these letters. He was quite apologetic. There was a federal program that, if people would accept it, they would essentially be placed on parole without ever having a hearing, and if they behaved through the parole period, then they were released, and there was never any court record. The Department of Justice attorneys asked if I would concur with that, and I said, "Sure." He wrote me a sincere letter of apology, and that was the end of that. But that was an experience that I could have done without. [laughter]

Later, I had to close the Avondale Research Center, which was in Avondale, Maryland. It had been at the University of Maryland for quite some time, and then the Benedictine monks had a fancy building in Avondale, which they wanted to get rid of, and so the Bureau of Mines acquired this Benedictine monk bit, and turned it into a

research laboratory and so on. It was not centered anywhere near any mining activity, obviously, so if you looked around, it's to see what you might do.

I should drop back a little bit. When the bureau was first formed, the question came, "Should the research be done in the vicinity of Washington, D.C., or should it be scattered throughout the country?"

The Bureau of Standards was established about the same time. The decision was made for the Bureau of Standards to do all the research in the Washington, D.C. area. The decision was made—I think, properly—for the Bureau of Mines, "No, let's scatter these research labs out around the country," which was done. There had been many, many different research labs started up and closed down, a broad range of activities from 1910 on. Avondale had been around for quite some time, so Avondale was the logical one, and we closed that. That was a great success.

One man in particular that I had working for me, Bob, ended up being head of the management and did a crackerjack job with people. I insisted that people care about people. That didn't always happen.

I got a call one day from a lady in Denver whose husband had died while working for the Bureau of Mines, and she was trying to get some insurance and pay that was due her and such. She'd been working at it three months, and they kept sending back the forms that she had not filled out properly. I flipped my lid, called the guy in charge out there and said, "Now, you get somebody out there, and have him stay with that lady until the forms are filled out right. You know? That's one of ours!" So, he did, and that solved that. [laughter]

Well, we did the same thing at Avondale and offered everybody a job some place else, most of them in Albany, Oregon. Some went; some did not. We gave the man and wife a trip to Albany, Oregon, to look around, to

see what it looked like. Did you want to go there or not? It was the proper thing to do. A corporation would do that, and a trip to rent a house or buy a house, if they wanted to. Maybe half of them took that up. The others did something else. I received letters, mostly from the wives, thanking me for their transfer, because they'd gone from metropolitan Avondale—it's a chunk of Washington, D.C.—to life in Albany, Oregon. Quiet, nice, quiet community, and the wives were particularly appreciative.

Well, and plus the process of doing that in a human way.

Yes. There was no reason not to. I always tried to do that. I never understood people that don't do it in a human way. It's much easier to do it in a human way. [laughter]

Closings sound like a negative thing, like it would be a hard thing to do.

It does sound negative, but I think it's harder to do a negative in a successful way than a positive thing. You can always be a hero doing a positive thing, but try and do it right, and you get the congressman involved. Everybody's telling you what to do and how to do it, and you've got to go with your own best judgment and some people that you trust to do it right.

So that ended up feeling like a success, those three closures?

Yes. Well, just keeping the bureau going, because it wasn't too long after I left that it was closed. I left in 1987, and it closed in 1991, 1992.

So, did you know it was on the way out, when you were doing these closings? Could you see that coming?

Yes. I was hopeful that it wouldn't ever be closed, I guess. I used to give speeches about, well, if you do eliminate the research, you got to keep the mineral and information in, because the government can't operate without it. It couldn't. There were some strange things on the Hill that would come up, people ignorant. Oh, one proposal was made by a senator when we were arguing with South Africa about their bit, and sanctions were on South Africa, "Let's destroy their economy. Let's sell the gold out of our treasury at a greatly reduced price and bankrupt South Africa." [laughter]

I wrote a very nasty letter to the Hill, which got published in the *Congressional Record*, and my friends were waving it and saying what a stupid thing this was to do, you know? I said, "What will happen is, South Africa will buy up all the gold and then sell it back to you at a raised price." What a dumb thing that was to do.

Most of it just day to day. I stayed very busy. I went to work. I left the house at seven. It was ten minutes to the office. I never came home before six. Part of it was that it was easier to come home at six than fight the traffic at five, but it also gave me an hour, hour and a half, after everybody had left to get some quiet time to get something done, because all day you're busy on the phone or whatever.

The last year and a half we were looking around at different office buildings where the bureau might be moved. It did move. That problem started in 1985, I guess, when we were told, "The Bureau is going to move the day after tomorrow," and they didn't move until, oh, 1988 or 1989. The fellow that worked for the Department of the Interior went to GSA, and GSA is in charge of the buildings. We were looking at a very nice building near old Alexandria in Virginia, a new building. He and his staff wanted to go out, as far as I knew, and I called to meet them downstairs in their cars, and we would go out and review this building.

I went down, and instead of going south, we were going north, and I literally got kidnapped. Today I'd force the car to stop and get out, but I went along with it, and we went out to look at one of Stennie Hoyer's office buildings. I got kidnapped by the GSA to go out and look at that. That did not leave me in very good humor. [laughter]

Now, when the U.S. Bureau of Mines closed down, what impact did that have on Nevada?

Well, it lost a fair amount of payroll here. I should remember what the budget for the Reno research center was, but I don't. Must have been between five and ten million dollars. The university gained a building. It lost some research capabilities. There's nobody doing mining research anymore. Companies do a little bit, but our mineral research—that's not being done now.

Neither is it being done by the university?

Not nearly. No. There was a minerals institute program administered through the Bureau of Mines where we gave five million dollars a year to various universities. Somehow or other, somebody arranged that the Mackay School of Mines got about nine hundred thousand dollars a year. I don't know who that was. [laughter] You know, as a matter of fact, I had nothing to do with it. I get credit for it. I might have had. I didn't have to have. When the people I charged with making the mineral institute allotments and selections ended up with the School of Mines, that was all right. So the university lost that thing. It really hit the School of Mines. Nearly a million dollars a year. That's a lot of money. No one has made it up, by any means. That money's gone.

You've named several things today that had a major impact on mining in Nevada and in the United States, including the closing

of the Bureau of Mines, and the regulations that are forcing mining to go to other countries, and you've really been where you could see these trends begin and where they're headed.

Yes. I had arguments with some of them. A thought comes to my mind of a pleasurable event I'd like to tell you about. The Copper Club is a group with the American copper companies, which are fewer now than they were then, but a fairly prestigious organization headquartered in New York City. Once a year the Copper Club would have a meeting, and they were kind enough to invite me to the head table of the Copper Club. Now, when my father was back in New York in the early 1900s, and money was plentiful, he would stay at the Waldorf Astoria. The meeting was in the Grand Ballroom of the Waldorf Astoria. I'm sitting up at the head table and on the dais, looking out over all these people wearing tuxedos—black tie affair, you know—and I looked up and said, "Dad, I hope you're watching." [laughter] That was an exciting event for me. I went up there every year.

I had a gentleman that worked for me, Jim O'Donnell, who was totally unappreciated in the bureau and in the Department of the Interior, I think. He had worked in the White House during the Nixon administration on some mineral priority problems, had been a metal merchant on his own, buying and selling that material. His family must have been in the business, but he knew everybody in the United States that had to do with marketing minerals. He knew all of the people in Europe that had the same bit, or had contacts with them. He and I made two trips to Europe to visit with mining organizations—government and private—and he knew everybody. I had the grandest time meeting those people. A whole different approach to mining. These people had been in business for a long time. Well, I visited one mine that had been operating a thousand

years. [laughter] It's closed now, unfortunately. Been operated a thousand years. Yes. But it was largely through him; he was the one that encouraged me and had these contacts to make it worthwhile. So we went from morning to night with government organizations and private companies talking about it, and it was exciting. They were pleased. The director of Bureau of Mines had never done that. One of my nicest trips was to South Africa. South Africa, of course, is important mineral-wise. The good Lord really loves South Africa, because he gave them most of the world's chromite, diamonds, manganese, gold, fluorspar, asbestos, platinum. Very, very tremendous operations, and they are great miners.

With my start there was a gentleman named Barry Hornabrook, who was a mineral attaché with the African embassy. He was initially stationed in New York, but then was moved down to Washington, D.C., and he and I became good friends. The Africans were obviously very interested in the Bureau of Mines, and particularly the director, and they were most kind to me with invites, but for a reason, and they weren't shy about that reason.

There were two embassies in D.C. that did that. Strangely enough, one was the Chinese embassy. I got invites to the Chinese embassy, it seemed, every other month, and sometimes to dinners with just the Chinese ambassador, and I never really understood what that was all about, but nevertheless, we did. Nobody ever asked me to do anything. Well, diplomatic doesn't do that, but Africans I was very interested in, and I wanted to go to South Africa and was able to make the trip to South Africa. Their equivalent of the Bureau of Mines—very roughly equivalent, because it's quite a bit smaller—was headed by a fellow named Piet Hugo. He came to the U.S., and before he came, I asked him, "Would you like a tour of Nevada gold mines?"

"Yes!"

So, I met him and Barry Hornabrook in Washington, D.C., and we flew out to Salt Lake City, and then drove to Elko. I had called up my friends in the U.S. mining bit. At that time there was only the Carlin Gold Mine of Newmont and the Independence Mine. It's interesting. We got there in the afternoon, and that evening there was a meeting of mining geologists, so these two fellows could tell them about South Africa mining, which was fairly unusual for Elko. The next day we went out to the Independence Mine, and come lunchtime, gosh, they had hors d'oeuvres and a table set up, and everything was fancy. The next day we went to the Newmont Mine and went through Carlin Mill and such. Come lunchtime the manager . . . I wish I could remember his name, because he was a real nice guy. They hadn't done anything, you know, "Geez, didn't you guys bring any lunch? We got some emergency rations here." So we ate the emergency rations. [laughter]

Then, we came to Reno and went through the Bureau of Mines research center and told them a little Nevada geology and history on the way to Reno. It was the weekend. I went up to the lake, and my brother owns a marina at Lake Tahoe. So, well, this is legal business, so we got about a forty-foot sailboat and took him out sailing and had a grand time. Then Piet returned to South Africa.

When I flew to Johannesburg, Beverly went with me, and they gave me a grand tour for about two weeks of *everything* in South Africa. We were getting corrections in Bureau of Mines reports on their reserves, and they were particularly interested in manganese. They had one *huge* manganese deposit, the size of a small county. Every day we went out to one of two airports and hopped in somebody's King Air and flew to a different mining property, from chromite, coal, diamond, platinum, and asbestos, to manganese. The manganese was at Hotazel—hot as hell. Hotazel in the Kalahari

Desert. When I flew there, there were no accommodations for ladies. We were going to stay overnight there. So they arranged (I paid for it) for Beverly to fly to Capetown from Johannesburg and be met there by a good geologist and his wife, and they showed her Capetown for the day and a couple of nights and then flew her back. I met her again back in Pretoria. It was a grand trip and a grand time with them.

I went to one of their major operations, I should mention, Palabora, which is near a game reserve. We later toured the game reserve, but Palabora was built by a classmate of mine, Norm Warren, from Elko, Nevada. He was largely responsible for the design and construction of Palabora, though he wasn't there at the time.

We are talking about successes while you were in Bureau of Mines. Was there anything else that you wanted to touch on?

I don't think I mentioned that my appointment was supported by two individuals, Hollis Dole and Bill Fisher. Hollis Dole had been state geologist for Oregon. He'd also been Assistant Secretary of Interior during the Nixon administration, and, strangely enough, he'd been Nixon's roommate in college, though Nixon later fired him from the Department of the Interior, at least his friends tell him that. [laughter] Hollis, I got to know through a friend in Reno, Bill Johnston. They had gone to grad school together in Utah, and for some reason or other, Hollis Dole and I hit it off. Hollis Dole was a very close friend of Dan Miller's and very active in the state geologists, so when this opportunity came that I might be appointed, I called up Hollis Dole in Oregon and talked to him, not recognizing the very close tie that he had with Dan Miller.

Bill Fisher was head of the Texas Bureau of Economic Development, the equivalent of the Nevada Bureau of Mines. We had had several contracts with them in the NURE

program, and I got to know Bill quite well, so I called him up, also. I did not recognize the very close ties he had. Hollis Dole and Bill Fisher were responsible for Dan Miller getting appointed as assistant secretary. I could not have talked to two better people in the world. Strange how you make these friendships and ties.

They gave Dan Miller hell every time they met him for not grabbing hold. Dan Miller would not. I don't know why, but it was just the way he was. I remember one meeting at the Cosmos Club in Washington, D.C. The Cosmos Club is a very, very fancy, private club that was established by a geologist, John Wesley Powell, of the Colorado River Survey. Bill Fisher had had a little too much to drink, I guess, and had Dan Miller over in a corner and continually referred to him as the reluctant secretary. The reluctant secretary, not the assistant secretary, the reluctant secretary, because he wasn't doing anything—and he wasn't.

His secretary was Gully Walters. Gully Walters intercepted all the mail. Anything she thought was important, she sent to Perry Pendley, and the junk went to Dan Miller. If Dan Miller prepared a memo they didn't like, they'd change the memo and send it out over Dan's signature. Dan was just in the wrong place at the wrong time. Nice guy. Wrong place, wrong time.

You also had the support of Senator Laxalt at that time, too?

Yes. Oh, sure. Oh, we go way back with Paul. My brother ran for Congress in 1956. I ran for Congress in 1958, and mine was even more disastrous than my brother's. Republican-wise in the state, it was a disaster, so those of us interested formed a small committee of about fifteen people, and we met once a month for four years in Paul Laxalt's home in Carson City. I got to know Paul very, very well. I think my twin brother was fi-

nance chairman for every one of his campaigns. So I knew Paul from way back. We were friends and still are. I knew his brothers, John, Bob, Mickey. Played basketball against John in high school. Bob and I were good friends at the university. So, it was a friendship bit. He essentially had nothing to do with the initiation, I guess, of the appointment. The President's office had to agree with it, so somebody had to tell him, "Yes, I agree with it." So Paul Laxalt was the fellow to do that.

So it was really the help of Hollis Dole and Bill Fisher that made Watt say, "Yes, let's hire Bob Horton."

I think I mentioned that Watt said, "This is a presidential appointee. Do you know any politicians?"

"Yes, I know Paul Laxalt."

"He knows Paul Laxalt!"

So, that was that.

I also got to know Robert Byrd fairly well. Byrd was a great supporter of the Bureau of Mines. Byrd was the greatest supporter of West Virginia, to the detriment of the United States. I am not a great fan of Robert Byrd's. He cares more about West Virginia than he does about the United States. Maybe that's OK for a senator, but he kind of overdid it. He'd move Washington, D.C. into West Virginia, if he could. He's a man of great power in the Senate and great prestige in West Virginia. I traveled a little bit with him in West Virginia. He had a van set up, and I joined him a couple of times to travel and look at mining things in West Virginia. A very enjoyable individual, but, I think, a little overly impressed with himself. [laughter]

There were two other people that were very helpful in D.C., Al Overton, who was then president of the American Mining Association, and Keith Knoblock, a fellow that worked for him. Al kept me going. From time to time I'd get fed up, and Al somehow would sense that. I don't know why. We talked once a month, or we'd meet at different mining

get-togethers, cocktail parties or something, that are going on in D.C. all the time. The first couple of years, you go to all of them, and then pttt, the amusement wears off, but anyway, Al would commonly say, "Well, let's have lunch together." We would go to the Friends Club, and the Friends Club is a very, very exclusive, little, tiny club, just about a block from the White House on E Street, I guess it is. I could walk to it blindfolded now. He and I might be the only ones there for lunch. There were tables for, maybe, ten, twelve people, a little living room, several waiters and so on, a cocktail lounge in the living room. It was an old house. It's where Mamie Eisenhower used to bring her bridge club to play—her friends. We'd talk it over, and I'd go back all pumped up again. I'd feel better. He and Keith were my outlets.

It had to be hard to survive, especially that first two years.

Yes, it was. It was. You'd just get to the point, "Get off my back!" You'd get cornered. Strangely enough, I had at one time worked for the Nevada Bureau of Mines. The American Mining Congress had advertised for a position, and I wrote in to see if I might be interested, and they invited me back for an interview, so I flew back and was interviewed by Al Overton at that time. Al had to be sixty-two, sixty-three, and put me up at the Hays Adams Hotel, the fanciest hotel in Washington, D.C., practically, and I decided not to take the job. Keith Knoblock was interviewed for the same job, and he's the one that took it. [laughter] So, we go way back, but they were my outlet. I needed them very badly. Everybody needs an outlet.

What finally climaxed was that a new assistant secretary was appointed. I should back up a little bit. When Bill Clark took over as Secretary of the Interior, Bob Broadbent was the head of the Bureau of Reclamation, and he moved him over in Dan Miller's job

as assistant secretary, my immediate boss. Bob had been a frat brother of mine at the University of Nevada. I knew him from way back—a boy from Ely, Nevada. He'd been very active in politics in Clark County, been mayor of Boulder City and county commissioner, and was offered a job as the head of the Las Vegas Airport Authority, a job he couldn't pass up with the retirement bit, so he left. Washington D.C. does strange things. A Bureau of Mines person, who had been loaned to Bob's office, was probably the sharpest guy in there. Wayne Marchant was his name. He was made acting assistant secretary, and he used to work for me. So now, a former employee of the Bureau of Mines is my boss, and that was a little strange, too, but it worked out all right. Wayne did not take advantage of the situation. We acted like gentlemen about it, and it never came up.

But then, he left. I think he went out to Denver with the Bureau of Reclamation. When you're near the end of a President's term, people start looking around and wondering, "Where am I going?" So, he's no longer a career Bureau of Mines employee. He could have come back to the bureau, but he's got higher aspirations, I guess, so he went out to Denver.

They hired as assistant secretary a fellow who used to be with a brokerage firm selling municipal bonds, and interest rates went down or something. Municipal bonds went to pot. This guy had made a lot of money in it, and his Daddy from Mississippi had been a big contributor to the Republican Party, so they sent him over as assistant secretary, and he was a perfect ass. He called me in his office one day and gave me hell for not jumping up and cheering when he gave a little speech to the Bureau of Mines people. There were several incidents like that in the course of about two weeks, and he was a child. I thought, it's 1987. Reagan's leaving in 1990. I've been here long enough. [laughter] He was the needle that, I guess, broke

the camel's back or something or other. I was not going to go through that again with him. He only lasted a year and left.

That would have been one year too many for you?

That would have been one more year of hell, and I didn't need that. Jim Taranik had talked to me from time to time about coming back to the School of Mines. I was sixty-one. At the state university, they've got an age sixty-five retirement bit, I think. So, I thought, "Geez, if you're going back, you better do it." So that was another aspect, and I came back to the School of Mines. They had the Center for Strategic Materials Research and Policy Studies that was funded by Laxalt and Tip O'Neill. They took the money out of the defense stockpile fund and gave about eight million bucks to the University of Nevada for a new building and to establish this center. So, I came back as head of that. There weren't any employees. I was the only employee. There wasn't much to do. I spent my time raising money for the university.

Would you please describe that job for me?

Paul Laxalt and Tip O'Neill joined forces to get some money for the University of Massachusetts and for the Mackay School of Mines. The funds came from the Strategic National Stockpile, which had some excess money in it. Senators and congressmen love to find excess money. The net result is that the university received, I think it was, eight or eight and a half million dollars for the Strategic Materials Research and Policy Study Center.

While I was director of Bureau of Mines and thinking about leaving, I had met Jim Taranik in Washington, D.C. He came over to talk about Mackay School of Mines when he was thinking about accepting the job as

dean of the Mackay School of Mines. We saw each other quite often after that at various meetings, and he said on several occasions, "When you get ready to leave the U.S. Bureau of Mines, let me know. We'd like you back at Mackay." So, when I got ready I let him know, and he said, "Come on back."

So, I came back as Director of the Center for Strategic Materials Research and Policy Study. The first part of that job was overseeing the building of the third, I guess one would call it, Mackay School of Mines building. Both of them are called the Paul Laxalt Materials Research . . . or Materials Engineering Buildings. That took about a year, year and a half. During that time we were aware that the old Mackay School of Mines Building had to be remodeled—remodeled in the sense that it was structurally unsafe. It was no longer occupied by students and could no longer be occupied unless some structural changes were made. That was going to be relatively expensive. Some funds would be available from the eight million dollars, but additional money was also required, so one of my first jobs was raising funds. Through my familiarity with the mining industry and acquaintances, I began contacting major mining companies, largely in Nevada, for gifts and contributions for remodeling the building. I forget now, but I think I raised somewhere between a million and a half and two million dollars.

So there was adequate money from this 8.5 million for the third building, but not for the remodeling of the original Mackay School of Mines building. So, that's what you were raising funds for?

Yes, and additional funds. I retired before the old Mackay School of Mines building was totally done, and President Crowley had to find additional funds to finally finish it off. I should note that besides making these structural changes—and I guess the details

do not concern us here, but it was a very unique solution—in addition, a four-story building was built within the three-story School of Mines Building, in two-thirds of it, to house the Engineering and Mines Library. It's a structural steel building within the old School of Mines Building.

Now, if there is any building in the state of Nevada that has a significance, it's certainly the Mackay School of Mines Building and the statue of John Mackay out front and its position on the Quadrangle. It's a symbol of the university, and in some instances, of the state. I don't know if we'll have a School of Mines forever, but that building will be there forever. [laughter] Now that it's remodeled.

That was a pretty long-term project?

A two or three-years' project, yes.

Can I ask what was the response you got when you were out fundraising from the mining companies to support the Mackay School of Mines?

Generally good. I didn't get as much money as I had hoped from them. It's largely gold mining companies in Nevada, but they are hit from every angle for contributions: from local schools, local government, other state agencies, charities, you name it. [laughter] There are requests coming in constantly to mining companies. They do contribute largely, but it couldn't all go to the Mackay School of Mines.

I guess my one disappointment was that I contacted all the suppliers, too. Now, suppliers make a lot of money off the School of Mines, and there was only one supplier that made any contribution whatsoever, out of the hundreds that make several millions of dollars. I was disappointed by that result, but people give where they want to give. [laughter]

The function of the center really didn't get started under me for two reasons. One, there were no operational funds available. My salary was covered by the university, rather than from the center funds. Additionally, I probably was the wrong person for the job, coming from director of the Bureau of Mines. You would have thought that my education there would have prepared me very well. Well, the problem was, it over-prepared me. I didn't see any place where a small center could compete with the facilities that the Bureau of Mines had, with 400 people in Minerals and Materials Information Center cognizant of all foreign activities; several hundred people on mineral policies advising the President, the Congress; several Ph.D.s with mineral economic backgrounds.

And one continually gets held up. Now that Russia's disappeared, it's even worse. No one ever came up with a definition of "strategic materials." Strategic is defined in the Defense Production Act, but not strategic materials. If you ask knowledgeable people to list strategic materials, mineral materials, they'll start with those first produced by South Africa—platinum, chrome, manganese—all necessary for a whole host of applications, and then perhaps go on to the other materials. The government stockpile was built after World War II out of concern that we would not have the materials we would need for an extended war effort. One thing has changed remarkably. There is no longer a Russian threat or a communist threat. That has disappeared, so who's going to have this long-term war? Additionally, the Defense Department began not to support the Strategic Materials Stockpile, and for a good reason, in their belief that the next war would not be a duplicate of World War II and last four or five years, but we would be damn lucky if it lasted a week. [laughter] If it was a major war, a nuclear war. What was in the pipeline would be what was used. What was in stockpiles, forget it. So, I'd have

to say, under my tender care, the center never really got started.

So, the entire responsibility for you was the building, and there was no research actually done while you were there?

No. There was not. That and then in the last year or two years I was there I became associate dean when Dean Richard Bradt showed up and had me made associate dean, and then I was helping with administration matters and other activities.

So, you had basically two jobs, as head of the center and associate dean.

Yes. Right. The worst dean that the Mackay School of Mines ever had, and I'd be pleased to have that in print. [laughter] He's no longer there.

You were associate dean under him. How did that go?

Oh, fine. He and I got along well, but he was a very strange man. He bordered on the genius. He might have been a genius, IQ-wise, but his people skills were non-existent. Totally non-existent. He has since gone to Virginia Polytech Institute, VPI, at Blacksburg, Virginia, and there was an article in the local paper not too long ago that he had been voted the most outstanding instructor at VPI. He did get along well with students, though he separated them into good and bad very rapidly, but if he had good students, he probably was an excellent instructor. He has a worldwide reputation, particularly in Japan. He is fluent in Japanese—taught himself. An expert in ceramics. But he was not the proper one for Nevada. [laughter]

I'm unsure now of the center's status. I'm not sure what it's doing. The Defense Department ended up being responsible for

monitoring the contracts by reason of the funds coming out of the Defense Stockpile, which used to be under FEMA, the Federal Emergency Management Agency, but was transferred to the Defense Department, so it was Defense Department auditors that were coming out here, and I met with them often while we were building the building. Typical Washington, D.C. bureaucrats, they get buried in the fine print sometimes. I'm not sure where it stands now.

So, essentially, what you did then is move over and work for the Mackay School of Mines as associate dean?

Yes. The point of the grant was excused as the establishment of the center, but in all political truth, the reason was to build some new buildings. Both for Tip O'Neill and for Paul Laxalt. Tip O'Neill was the high ranking senator from New York. He retired shortly after that.

What were your responsibilities as associate dean?

Oh, assigning spaces in the buildings, aiding in the remodeling again of the Mackay School of Mines Building, liaison with the mining industry in the state, helping Dean Bradt on many small issues. Frankly, I retired one year early, because I became bored with the whole situation. Dean Bradt pretty much looked upon me as a go-fer. And rather than fight the situation, I thought it was a good time to leave.

Since retirement, then, what have you been doing?

Well, shortly after retiring I was asked to join the board of First Miss Gold, which was operating the Getchell Mine out of Winnemucca, Nevada. I served on their board for ten years. Well, thinking back now,

I was on the board before I retired. I served in 1987, and I didn't retire until 1990. I was again on the board in January of 1988 and served until May of 1998.

I enjoyed the work in retirement. Wasn't all that much. We met quarterly, and, occasionally, committee meetings earlier than that. I had not been with major companies. First Miss Gold was a subsidiary of the First Mississippi Corporation of Jackson, Mississippi, which was a very large company—largely a chemical company, but with oil and gas interests, coal interests, steel interests, and such. This was on the New York Stock Exchange. So I gained a good insight and experience in major corporate activities. When I get an annual report now from some company in which I might be invested, and a proxy for the stockholders meeting, I have a much deeper understanding of what's going on than I ever did before. So it was good exposure and great education, really.

What were some of the key points you learned?

Well, in executive compensation, as the company grows, you've got to compensate the presidents and the other executives. There are private organizations whose business it is to survey the world—in this instance the mining company's world—and find out: what are you paying your president? What perks does he get? What bonus does he get? Does he get a car? Does he get a country club membership? We would review all this for companies throughout the world and decide where we wanted to be and what we ought to be compensating our executives. For a fellow that had worked for universities and the federal government, the compensations always looked rather excessive, but nevertheless, they were competitive.

Quite a bit of difference between government service and the private sector?

Yes. In a large part of the operations, I wasn't always in agreement with the techniques. I suppose I was one of the more vocal members of the board, and used my computer, essentially, to review operations and funds and whatever and call attention to what I thought were shortcomings.

So, the board looked closely at operations of the mine?

Oh, yes. I did. Not all members of the board. Some did, some didn't. Some were outside directors; some were in. Well, there were a large number of outside directors, but at the beginning, and for two thirds of its history, many of the directors of First Miss Gold, and then later, Getchell Gold Corporation, were members of the board of First Mississippi Corporation. First Mississippi Corporation spun off First Miss Gold by distributing the stock that it held to its stockholders. Then the corporation was renamed the Getchell Gold Corporation. We'd had an earlier public offering, and then three subsequent public offerings, which were educations themselves, in order to develop the Getchell Mine.

When First Miss Gold started the mine, Cecil Alvarez was the president. He and I remain very good friends and usually go fishing every Tuesday. He's also retired. Cecil was able to demonstrate that there was enough gold ore in the dumps to pay off the purchase price of five million dollars. There had been an earlier pit. Drilling around the pit and inside the pit developed another one million ounces of reserves, and that was enough to build a mill and get started. The reserves today are about twenty million ounces. It is truly a world-class mine—unexpected that you would get that. Well, somebody sold twenty million ounces of gold

for five million dollars, just this last winter. In May of this year, Placer Dome, a large Canadian company with world-wide interests, purchased Getchell Gold Corporation for their stock. They exchanged 2.45 shares of their stock for each share of Getchell stock. If you multiply the price of Placer Dome stock by 2.45 and the number of shares of Getchell stock that were traded for, you come up with a price of one billion dollars. So First Mississippi Corporation bought Getchell for five million dollars and later, after substantial investments, sold it for one *billion* dollars. Quite a gain! [laughter]

And all because of finding this twenty million ounces of reserves.

Yes. Exactly.

The Getchell Mine is a long-time Nevada mine.

Yes, it was started by Noble Getchell and George Wingfield and Bernard Baruch. Baruch was a major financier in New York—not quite the J.P. Morgan, but almost the J.P. Morgan—and he was a substantial investor when Wingfield consolidated the mines of Goldfield, Nevada, and established the Goldfield Consolidated Mining Company. Noble Getchell came to Wingfield with this property, and Getchell and his mining engineer, Roy Hardy, examined it and decided to buy it. They knew they would need additional funding, and so they contacted Bernard Baruch, and he and Newmont Mining Company put in the money that started the mine, initially. So it was discovered in 1934 and began operations in 1937. While under Wingfield's operation, it paid thirty-eight million dollars in dividends—unheard of for a Nevada mining company. [laughter]

At that time it was not usual?

No. It was never usual for a mining company to pay dividends.

So, you have a little sense of the history of this mine?

Well, I was going to high school in Winnemucca. The kids that lived at the mine drove in each day to go to high school, and everybody knew about the Getchell Mine, what it was doing. During World War II, it continued to operate, because it produced arsenic, and arsenic was needed for the war effort, I'm not sure why, and they also produced quite a bit of tungsten from some nearby properties.

So, even though gold was restricted, this was one of the few mines that could stay open, because it had a strategic material.

Two things happened, I'm quite certain. One is that it was allowed to operate because it produced arsenic, and it was the action of Senator Pat McCarran in Washington, D.C., that got this exemption through.

Wingfield and McCarran were very close, and McCarran at that time was one of the most powerful senators in the U.S. Senate.

Right. Not all elder Nevadans recognize that Nevada almost ran the Congress of the United States in the 1930s and early 1940s with Pittman and McCarran as senators, and Scrugham as a representative. We were all-powerful. McCarran was a close friend of Roosevelt's, or a strong supporter of Roosevelt, until 1936. He and Roosevelt fell out, I believe, over the packing of the Supreme Court that Roosevelt proposed, and then they were enemies. If you read Schlesinger's biographies on Roosevelt, a lot of the paragraphs are filled with curses of Pat McCarran. [laughter] He was an interesting man. I knew him well. A gentleman

of the old school. Perfect-looking senator. Long, flowing white hair. Looked like Senator Claghorn from Kentucky, but he was no fool. He was a brilliant man.

My sister worked for him in Washington, D.C., for a little while, but I knew him. I was active as a young man in some oil and gas and some other things. I visited him in Washington, D.C., and would see him in Nevada. As a matter of fact, he appointed me in high school as a third alternate to Annapolis. Third alternate means that three other guys got to flunk before you get a shot at it. [laughter] Well, that didn't happen. He and my father were friends. Nevada was a hundred thousand people then. Everybody knew Pat McCarran. It wasn't unique that I knew him. Everybody knew him. Everybody knew Pittman. Everybody knew Scrugham.

And those are names that are on buildings now and roads and that type of thing, too. It's interesting to think of Nevada being in control of the U.S. government at that time, with such a small population.

Well, Wingfield was the manager of Nevada, and many would attribute that to him. He ran the politics, Democrat and Republican both. A very influential individual.

At the time you were growing up, too, you were aware of it?

Yes. I was interested in politics then, and you met politicians; they came by. [laughter] Came to the schools. Came to the towns. When we were in Unionville in the late 1930s, the politicians would come by Unionville. I remember a Mr. Berkeley Bunker from Las Vegas, or Mesquite, or Bunkerville, more accurately. He was running for Congress, and he came by Unionville soliciting the five votes that were in Unionville, I guess, but that's what one did at that time.

Quite a contrast to today when we have candidates dropping out, because they can't raise millions of dollars to do TV campaigns and so on.

Yes. You probably haven't heard, but Dole dropped out today or yesterday—Elizabeth Dole. She couldn't raise enough money.

Oh, no, I didn't hear that. That's a shame.

A closure on the McCarran story. One of my closest friends is Web Brown. His father was Ernest Brown, district attorney in Washoe County during much of the 1930s. Things were a little hairy in Washoe County with Baby Face Nelson and McKay and Graham at the Bank Club and various hoods running around, and nobody was sure what was going on. We jump ahead many years, and I was sitting in a bar in Yokuska, Japan, having a beer with some of my buddies, and the Armed Services Network was on the radio saying, "We interrupt this program for a news flash. Senator Pat McCarran of Nevada died in Hawthorne, Nevada, while on a campaign swing; and Ernest Brown of Reno, Nevada, has been appointed to replace him." I bought a round of beers for the bar. [laughter] I knew Pat, and I was sad to see him leave, so we drank to his demise, and then we drank to Ernie Brown's appointment in a bar in Yokuska. Reno, Nevada, was very close there for a moment. [laughter]

It was a lot of fun then in Nevada. I mentioned running for Congress in 1958. You knew everybody. I knew Vegas like the back of my hand. I can't even find a pay phone in Las Vegas now. [laughter] It's changed so much. With my father being in mining, I knew lots of mining people, or I knew of them, their names—both the heroes and the scoundrels. Not so much now. I knew the manager of every mine, the second in command, the third in command, the pit superintendent, the mine superintendent,

but now, for one thing, there are too many mines. They're very large; the staff turns over. People get promoted, or they move on to foreign operations or whatever. Most of them don't stay all that long. There's not the personal contact anymore. That's happened in all businesses in Nevada. It's not unique to mining. People don't know each other anymore. Individuals owned all the casinos, whether they were crooks or not, and now they're all owned by corporations. Same for mining.

I want to go back to Getchell Mine. Recently two men were killed in one of the Getchell Mines.

At Turquoise Ridge, yes. It's kind of a hard-luck mine. There have been five people killed there now. The first death was a lady that was crushed against the side of a drift by a truck. The second was one of the contractor's personnel that was crushed by a sinking bucket while they were sinking one of the shafts. The third man that was killed, I have less knowledge of his death, but the paper reported it was by a hose that came loose from a compressed air line and probably hit him in the head and killed him. And then these two miners were killed by a roof fall.

And you seldom hear of that type of thing.

Well, it's only in recent years there have been underground mines in Nevada. In coal mining, roof falls are very well known. There are about seventy-five miners killed each year in mining operations. Now, these are not all underground mines.

You're talking about nationally?

Nationally. These are coal mines, oil, sand and gravel operations, all sorts of operations. The paper reported that inspectors

had looked at the roof and had judged it to be safe before these miners went in.

So, it's an unfortunate accident, you said. No one can see through the rock. It had been judged safe?

Judging by what the paper said, supervisors and geologists had been underground and had looked at the area. I would assume that a round had been blasted and had been mucked out, and geologists were in there to map the new exposed faces, and the supervisors to look through it. I would suppose they were getting ready to do roof bolting or whatever was required, when the roof came in. It's not the mountain caving in. Doesn't take a lot of rock to kill people. A few tons or a rock in the head in the wrong place will do you in. It doesn't take a lot, but that is an unfortunate accident.

When you were on the board of directors, were you there during any of those accidents?

I was there during two of the accidents. We examined them very thoroughly to see what the causes were. People do some stupid things. The miner that was killed by the sinking bucket—the bucket has to come through a stage that's above the bottom of the shaft, and the bucket got hung up. Now, this bucket is about eight feet high and five feet in diameter and solid, heavy steel. It's used to muck out the bottom of the shaft. It got stuck, and the miner walked under and looked up at the bucket, which was probably about twenty-five feet above him. A cable was coming down as the hoist lowered the bucket, and the bucket got hung up. Cable came down, and finally enough cable forced the bucket through, and it fell on the man who was standing directly below it looking up. He should never have been there. We feel great sorrow for him. He paid heavily

for his mistake, but he should not have been under that bucket. I would know—anyone would know, don't get under that bucket.

The miners killed by the hose—who knows? I don't know if he unscrewed it, didn't know the line was loaded with air, or whatever. The two miners under the roof falling in—in coal mining it's illegal for miners to go under unsupported roof. Unsupported roof is roof in there where you don't have rock bolts installed to hold it up. In hard-rock mining that's not the case, because you don't always need rock bolts. The situation is quite a bit different than it is in coal mining. So, it would be very difficult to make rules and regulations defining what one had to do in a freshly blasted area. The area is always examined, and the large bars are used to bar down any of the loose rock, and you're very careful doing that and looking at it, but just for the case of a cave-in, a roof fall. To my knowledge, that's the first roof fall Getchell has experienced, so a rather unexpected event. I don't know how one avoids that.

What is the role of a board of directors in the case of an accident that causes a death like that?

To thoroughly examine and make any recommendations that would avoid similar incidents, if such recommendations are warranted. It's an advisory role, partly, but it can take an active part when that seems necessary.

So, you worked with the mine manager in an advisory role?

Well, with the president, chief executive officer. The board of directors don't individually go out and tell people what to do. That would be very poor management. [laughter] The board of directors represent the stockholders. That's the purpose of a board.

You worked with that for about ten years, and you just recently finished doing that?

I became too old under the bylaws of the corporation. You can't be nominated when you're over seventy years of age.

Have you been working at all in the mining industry, since you retired?

No.

You retired as assistant director of the Mackay School of Mines and also from the board of Getchell, and you're not doing any consulting work at all, anymore?

No. I occasionally will get a call and maybe help somebody, but most anybody that would hire me is either dead or retired. [laughter] One is forgotten quite quickly. Well, I've been gone from the U.S. Bureau of Mines for twelve years. Many of the people I knew in Washington, D.C are also retired. Those that I knew in the mining industry are retired, so it's another generation now. [laughter] I'm enjoying retirement. I could go out and do some more hustling, perhaps, and do more consulting, but I don't feel the desire or the need to.

You've received many awards and recognitions, one of them as a professor emeritus. Is that correct?

Yes. That's because you're there long enough. [laughter]

It happens automatically?

Pretty much.

Are there any awards that are special to you in some way?

Yes, there are some. In the late 1960s I was chosen as Engineer of the Year for the Reno chapter of the National Society of Professional Engineers. And that was very meaningful. I guess the most auspicious award I have, certainly, has to be the Honorary Doctorate Degree that the University of Nevada gave me. That was totally unexpected. I discovered that the university had been in contact with my secretary for over a year at the U.S. Bureau of Mines. Becky, bless her soul, never said a word. That was 1985. Totally unexpected.

Did you come back to receive that degree during the graduation ceremony?

Oh, yes. Oh, you got to do that. That was exciting. I was most pleased, and a little flustered. [laughter] And I don't fluster very easily.

Was a Ph.D. something that you'd always wanted?

I had thought of grad school, but I had never attended. I don't know if the School of Mines still does this or not, but it was not uncommon in the olden days that after you were out and had demonstrated substantial experience, you could then write a paper and be awarded the degree of geological engineer. I did that for the School of Mines, and it was the equivalent of a master's degree. Some would argue that. I thought of grad school a little bit, but life got started too fast. [laughter] I never got back, never got to grad school. I don't guess I resent that. If I had it all to do over again, what I might do—with beautiful hindsight—is get a master's in business administration. That's the best combination if one wants to rise rapidly in a corporation—an engineering degree plus a business administration degree.

Did you see many students going in that direction when you were working as asso-

ciate dean or in your connection with Mackay School of Mines?

No. Well, one ought to go out and work for a while. If you graduate when you're twenty-two, twenty-three, you should work for two or three years to get a handle on life and things. I think you'd get a lot more out of a business administration course, if you can work for awhile, and then go get the MBA.



One of the things that I wanted to ask you about is changes in minority participation, ethnic minorities here in Nevada. Have you seen a change in that over time? You mentioned it was different in Washington, D.C.

Yes. Well, I grew up not knowing there was a black problem any place, that there was a race problem anywhere, I guess, outside of hearing, maybe, a little bit about the Ku Klux Klan or something, but knowing nothing of the South. As a young person, your universe is fairly small. There were two black families in Winnemucca when I went to high school. One of them was the Horton family. [laughter] And one of them was Richard Horton. My brother's name is Richard, and he and the black fellow used to get confused now and then. There was another boy that came to high school, who was a heck of a trumpet player, but as I look back, they never came to any school dances, and I'm ashamed of myself that I was unconscious of that. It never occurred to me that they weren't at school dances or weren't participating in school activities. They came to school. I don't know that anybody in the high school, the students, felt differently about them, but nonetheless, they didn't come participate in any school affairs.

As I got older, I came to work for the university. In 1958 I ran for the U.S. Congress. I still thought at that time that there

was no black problem, race problem, in the state of Nevada. There weren't very many black families in Reno, but my education came very rapidly, as I went to Las Vegas and visited the Westside and started talking to blacks and was terrified to discover that Nevada was known by blacks as the Mississippi of the West. Mississippi is the worst state in the South, according to the blacks, as regards discrimination, and Nevada was just as bad. A black leaving Oakland with his family driving east, could not stop for a toilet, for a room, or for a meal until he got to Denver, Colorado, over a thousand miles. That was the case in Nevada. Couldn't believe it.

So there was gross discrimination, and blacks were not allowed in casinos. There was one club in Reno, the China Club on Commercial Row and Lake Street, that catered to blacks coming from Oakland, and you never saw a black in a casino or anyplace else. Governor Sawyer, during his administration, bless his heart, decided that had to stop, and told the casinos so, and the next day there were lots of blacks in the casinos, and nothing changed. Nothing was any different in the casinos, seemed to me. I wasn't patron of the casinos particularly, but it just went from all white to black and white.

And there were no riots?

There were no riots. No, nothing like that. Las Vegas has had more of a problem, because they've had more blacks. Reno has a lot more blacks now, and Nevada—the whole country—still has a discrimination problem. We're not over that by a long shot. Two of my daughters went to Hug High School when it first opened up, and that was largely black. They have different stories and different approaches, but they're probably more knowledgeable about blacks than I am.

What about other minorities?

Well, Nevada was unique, and Russ Elliott as historian prof, and a very good friend of mine—he and my wife's mother were very good friends in McGill, Nevada, way back when—had written extensively of minorities in mining camps. I believe he told me once when he wrote an article on Round Mountain that he identified twenty-six distinct ethnic groups in Round Mountain, Nevada, which was quite small at the time. Of course, McGill was famous for Greek Town, and an Italian Town, and whatever other town. I was in college and in a fraternity with quite a few kids from Ely and McGill, who were from Greek Town and whatever. They all took pride in their ethnic backgrounds, but that's not the reason that those separate enclaves were in McGill or elsewhere in Nevada—it was segregation. The same thing was true in Chicago. There was the Italian Town, the Irish Town in most major cities—their own little ghettos. I guess those have largely disappeared now. Those were done by the immigrants and then, perhaps, the first generation; but the second and third generations have left the ghettos, and that's gone. And the same thing has happened largely in Nevada. Tonopah, where I was born, had lots of Yugoslavians. George Vucanovich was from there. I worked for a George Chiatovich. Vidovich—lots of "viches."

Chiatovich is also a name that's very familiar in the work that I've done down in Silver Peak.

That's where George came from, Silver Peak. Yes. That was a large family in Silver Peak. George was the manager of the Overland Hotel when I was going to school, and I got a job as bellhop.

Then we'll have to mention the Bascoes. The Basques are a kind of unique ethnic group. They're damn proud that they're Bascoes, and everybody that I know, includ-

ing myself, who knows a Basque, is proud that he knows a Basque. [laughter] I don't know what it is, but the Bascoes bow to no one. Very proud people, hardworking, just a great group of folks. [laughter] Half of my high school was Bascoes.

But to some extent they've been able to save their culture, too, rather than completely melding in. We have various Basque festivals.

Yes. Well, they're proud of that. If you ever get to Winnemucca, go to Winnemucca Hotel, the last Basque Hotel in the state, I think. Last real Basque restaurant.

So then, from the time that you ran for Congress and learned that Nevada was considered the Mississippi of the West, what changes did you see in hiring practices or in the work force in the mines over the years?

More women coming into mining, but I don't recall noticing any particular change as regards race status. You still don't see very many blacks in mines, or in the mineral industry. One reason for that is that a lot of blacks come from the inner city, and they learn about careers in the inner city. Their exposure to careers is not mining or geology, so when they go to college, they don't choose to take mining or metallurgy or geology. I've met very, very few black geologists or very few blacks in mining in general. Now, whether the blacks avoid mining or not, I don't know that. Or just a matter of exposure, and do you want to work out in the boondocks?

Still, mining is largely in small towns, and it's my opinion that life for a black stranger in a small town is not all that hot, still. So a black family might be very reluctant to move to Winnemucca, but Winnemucca, for example, I've been told, is

over 50 percent Hispanic now, largely working in the potato fields around Winnemucca, so that has changed Winnemucca all right. [laughter] So the Hispanics have moved there.

A problem with getting older is that solutions seem more and more difficult. [laughter] They're not as simple as they might have been when one was young. Yes.

And what you're saying is that mining does happen in small towns, and sometimes the attitudes in small towns have not changed.

Yes, and if you're working the extreme, if you're working underground, that is a very tight society, and that might be difficult to break into. Conversely, open-pit mining is not a society. The truck driver might not even know the guy that's running the shovel or the person that's passing him in the other truck. It appears to me to be fairly remote relations, as opposed to being underground.

One of the underground miners that I interviewed called open-pit mining more like the construction industry, and he didn't hold it in as high a value as his own skills as an underground miner. Is that part of what you've observed?

Sure. The underground miner calls them farmers. They're not mining; they're farming. They're just digging up the dirt. Yes, it's totally different approach and totally different skills. The geology is the same; that doesn't change, but as far as the operation, you're in fresh air and blue skies, and you're not going up and down on a hoist. Yes, it's quite a difference. It's almost like two different industries.

And during the time that you've been in the mining industry, was there a period of time where most of the mining was done by open pit?

No, most of it was underground. It then went to open pit. Now, open pit's been going for a long time. Jackling started open pit with the Bingham Pit out of Salt Lake City; that was a Kennecott operation, but open pits in Nevada followed closely out of Ely, at Ruth, Nevada. For many years, copper mining was about the only open pit activity, because they were the only large ore bodies. We did not know of these large gold ore bodies, so most all metal mining—leads, zincs—was underground in smaller deposits, veins, whatever. It was underground, and it wasn't until some of these very large deposits were discovered that gold mining took off, and I can think of one lead and zinc operation, largely zinc, that's open pit. The copper still stays open pit. So it has changed in that affair. The mines were quite small, up until these huge gold mines of today. Even the Comstock was small. The amount of tons per day produced underground was rather small.

From the beginning of time until World War II, I guess, a miner was a fellow that could go underground, rig up a drill, drill holes in a face, load them with powder, blast them, muck them out, extend the track and the pipes there and the water line, set up, drill another round. Perhaps two people at the face—and those were *miners*. There are no miners in that sense today, unless it's an old prospector out someplace, a fellow sitting on a large jumbo, where he's twenty feet from the face, and he's running the drills hydraulically. Somebody else comes in and loads it. Somebody else fires it. Somebody else comes in with a mucking machine and mucks it out. So they're underground miners, but they're only using one skill at a time now. They might be multi-skilled. I wouldn't sell them short,

It has to be large scale now. In 1930, it wasn't unusual for a gold mining company to be mining a vein that might be four feet wide, dipping sixty degrees, two miners working on it, and they're taking it out to a

little fifty-ton mill, or, more likely, taking it down, loading it on a railroad car, and shipping it off to a smelter. Well, now there's probably no smelters he could ship it to. It would cost too much per ton to mine it in that small quantity now, so the small mines, are just uneconomic. If you can't run it large scale and keep your costs down, you can't do it.

Especially, with the way the price of gold has gone down over the last few years.

Yes. Or other metals. Same thing holds true for copper, too. Copper prices, lead prices, zinc prices. Metal prices have not gone up as much as the price of bread, milk, or gasoline. Gasoline hasn't gone up bad, either, really, but the price of bread and milk has. [laughter]

So, it's been a time for the metals industry in general to cut overhead in large operations.

The unique thing that is not always appreciated is that the Club of Rome, which is a group of economists, predicted that we would be out of metals in the 1960s, I believe. The Paley Report then, chartered by Truman, predicted that we would be largely out of metals by now. Well, the truth of the matter is, the known reserves of all metals today is greater than it has ever been in history, so we have not run out. We are running out. The earth is finite. There's no question about that. But geologists and miners have been very skillful at finding more and more deposits and cheaper and cheaper ways to mine lower and lower grade ores, and I don't see any reasonable end in sight. We don't know where the next discoveries are coming from, but they will be found.

I divert. This is one of the problems that miners have with land withdrawals, is that when the land is withdrawn from mineral

entry, where you can't go in and prospect, then that just reduces the size of the chessboard on which we miners have to play this game. You don't know where the next ore bodies are going to be found, or how they're going to be found. We don't know everything about economic geology, ore deposit geology, that we should know.

Explain the land withdrawal issue right now.

Well, I didn't feel this way fifteen years ago, but it has developed as I've watched. There's no question in my mind that the Sierra Club and the Wilderness Society and their friends wish to shut down all mining in the U.S. That is their objective. Glenn Miller, professor of Environmental and Resource Sciences at the University of Nevada, is quoted in the paper today about the water being pumped out of mines, and the loss of the water. Mr. Miller is a Nevada representative of the Sierra Club, and his objective—as well as the others—is to shut down all mining. I don't know where they think they're going to get their electricity and their cars and everything else, but they don't seem to have looked that far.

The extension of wilderness areas and other withdrawals, national parks, stair-step—all of these are fine and good, but there has to be a limit if you're going to keep civilization going. You can't have civilized life without miners. I don't think very many people know that or appreciate it, but you can't, absolutely can't. Mr. Miller knows it, but I don't know why he's so gung-ho about shutting down the mines. They want it in somebody else's back yard. That's not an unusual response, that we'll get it someplace else, you know, "Well, we'll ship the pollution and environmental problems to a foreign country, and then it won't bother us."

That's one of the, would you say, simplistic answers? Where instead of finding solutions ourselves here, we keep . . .

Well, there's no solution to making a hole in the ground if you're going to go mining, because you got to make a hole in the ground if you're going to take out minerals. There's no way around that, and people resent the hole in the ground. They should resent supermarket parking lots. Supermarket parking lots are black asphalt, and they cover a heck of a lot more of the United States than any mines, of all the mines put together. Mines just don't do that. I would often challenge my friends who talked about how horrendous mining is, "When you fly across the country, make a note when you see a mine." I've yet to have a person come back and tell me they saw a mine. I know where to look, and I have a hard time finding a mine from the air. [laughter]

"Environmental terrorists"—others have coined that phrase, and it's absolutely accurate. If they tell you that you're dying from all the chemicals and whatever we're using—and people are actually healthier, living longer than they ever have in history—it's a lie. But that doesn't suit their purposes.



You talked about a trip to Russia since your retirement. Would you describe that?

Yes. That was one of my fun adventures. The phone rang one day, and it was a person with the Citizen Ambassadors Program out of Spokane, Washington, which is a division of People to People International, which sponsors trips and trying to get people together. The Citizen Ambassador is where you have business people that visit their counterparts in other countries. It was a professor at University of Utah that had

started this Russian trip, and it was over-subscribed, and so they needed a second tour, a second group. They called up the American Mining Congress in Washington, D.C., and talked to the president there, and he said, "I hear Bob Horton just retired from the University of Nevada. Why don't you give him a call?"

So they did, and gee, I jumped at the chance, once I found out about it. It was at no cost to me. The people that attended, I think, paid something like \$8,000 for their tickets and accommodations, whatever, but I went along as the guide and as the spokesman for the group. We were accompanied also by a lady, an American citizen, whose father and mother were Russians, and she spoke Russian fluently, so I had a translator going with me. That didn't always happen.

We met the group in New York, and there were twenty-six of us altogether, I believe. We flew to Moscow and got there in the morning, and our schedules were rather tight, so you could either go to bed or see Moscow, so everybody chose to see Moscow. We were joined by a Russian geologist, Sergei Diatchkov, who is tall—six, three—dark beard, great build, handsome. I later met his wife—beautiful, blonde lady. Perfect, perfect, perfect family. But he spoke fluent Russian, spoke fluent English. He also spoke Spanish, Ukrainian, whatever, and he was a professor at Patrice Lumumba Friendship University. He joined us as a guide and translator, whatever, which was very fortunate, because he was a most forceful individual, and on occasion we needed that.

Now, we toured Moscow a little bit, the Kremlin, Red Square. Didn't meet with any groups at that time. Went to bed, finally. We had a pretty run-down place; it was a tourist hotel and wasn't much, rather shabby.

This was in 1991. At that time Gorbachev was in charge, and the Russians, including my friend Sergei, were looking for-

ward to Yeltsin getting in, so it was still communist. It had not yet dissolved, but Gorbachev was working on it, and Yeltsin was partially his opposition. They didn't speak too highly of Gorbachev and spoke very highly of Yeltsin at the time. I doubt that would be the case today, but nevertheless, that was the case then. So they were experimenting. Glasnost was in full swing. They wanted foreign investors; they wanted input from anybody about technology, not that they were any slouches in technology. They were well read. They might not have the latest scientific gadget, but they knew all about it. They had read the literature, so they weren't idiots by any means.

When you say that they were still under communist control, and that you needed Sergei to be a forceful individual, why was that?

Well, an early instance was our visas. We also had a KGB man with us while we were in Moscow. He didn't travel with us. We were sure he was a KGB man. [laughter] We discovered our visas only were good for Moscow, and we were going to travel to the Pacific Ocean. We were going to Magadan, which is on the Sea of Okhotsk, just off the Pacific Ocean, and lots of other places, so Sergei spoke with him. We each gave him a carton of cigarettes. On the advice of the Citizen Ambassador, we'd all brought two or three cartons of cigarettes, because that was the best thing to leave for a tip, or most anything else, was cigarettes, American cigarettes. [laughter] So we all were loaded up with cigarettes. We gave him a carton of cigarettes, and out he went to the airport, or wherever he was going, to get our visas changed. It took him four or five hours, and he came back and had our passports and then looked at us with a very sad expression I'll never forget and said, "But they took all

the cigarettes.” [laughter] So, we all gave him a couple of packs of cigarettes, and Sergei had had his little influence there.

When we flew from Moscow to Magadan, we were supposed to leave at ten o’clock in the evening, but we went out and spent all night in the airport in the foreign visitors lounge, which was very skonchy. I won’t go into details of the sanitary arrangements, but they were much worse than Third World countries. But it was fortunate. We left about eight o’clock in the morning on Aeroflot and flew for over eight or ten hours, from Moscow to Magadan. I could look out the window and see all of Siberia. We went up the great circle route, up above the Arctic Circle—we could see the Arctic Sea—finally landing down near Magadan. In those eight to ten hours I saw two galvanized tin roofs, and that was the only sign of civilization I saw in that whole time going over Siberia.

Most people have a strange idea of what Siberia is. I did, too. Siberia is all of Russia east of the Ural Mountains, so it runs from the Chinese border up to the Arctic Sea. It’s not all tundra and ice. There are some southern portions that get cold, too, but it’s not all just the northern part of Russia. It’s all of that. It was all trees. I could see a little geology. We did not stay at Magadan, but at Palatka Village, which is Russian for “tent.” We didn’t stay in tents. It was a nice little hotel, where the people were absolutely charming. This happened everywhere we went. The people were absolutely charming. We had a couple of meals with them. We took some short flights to mining operations. We went into Magadan. Magadan is where the prisoners were brought by ship to go to the gulags in Siberia. The citizens of Magadan were raising a monument to the 500,000 prisoners who had come through there and never returned. Just a sad, sad bit. Magadan and Moscow—all of it was dull gray, and everything was covered with dust. There were no discarded beer bottles, beer cans, cigarette packs—no trash anywhere. Russians

do not do that, but gray dust just permeates the whole bloody thing.

We went from Magadan to Yakutsk, and there the locals had fouled up. The people in Yakutsk didn’t know we were coming. [laughter] Sergei got on the phone and called the local geological group who was to welcome us and explained the problem, and in a half hour they had two buses, a lunch arranged, and a little tour set up, and a meeting with all their principals. Now, had you landed in Washington, D.C., and called me, I could not have got that done, but this one—it’s all put together and all done in a half hour. Most gracious people and individuals. Yakutsk is half Mongolian people on the streets. There are large diamond mines just north of it and some nickel and chrome properties. When we returned to the airport, the officials informed us we had no reservations, “You’re not going anywhere,” and Sergei took off. [laughter] Took him a half hour, but finally we had reservations, and off we went to Irkutsk, which is near Lake Baikal, where we went all the way across to the eastern edge of Russia. I was much closer to Reno at Magadan. [laughter] It would have been a lot easier . . . well, you can fly from Anchorage to Magadan now.

But we started coming back the other way. We visited gold mines and other properties. None of them appeared to be economic at all. The Russians sent a budget in. Money came from Moscow, that paid for the whole town—the barbershop and everything else that operated. Whatever they produced they shipped some place. No one ever made a correlation between what the budget was, and what the value of what they shipped was. Profit was a strange word to them. They didn’t understand profit at all. “What’s profit?” And these are pretty sharp people, but they really didn’t have a concept of profit. No concept of contracts. See the Russians have not had a civil code or a business code in their entire history. The czar ruled, and he set the rules until the

communists took over. There's no commercial code, no uniform commercial code. You make a contract with a Russian—you don't know what it means. It's never been tested in court. There aren't any rules for contracts. There aren't any rules for enforcement. There aren't any courts for enforcing. It's a bloody mess. [laughter] I don't know how they're going to get around that, because it takes some history to build that up.

All the things that make mining operations work here in the United States—they don't have the legal structure to make it work. What about the operations themselves?

They were well run, except the ore grades were lower than you can make a profit on. Some of the equipment was a little on the archaic side, and that's because they couldn't get equipment. In Magadan we took a little tour, and they wanted to show us a machine shop, and you try not to offend the host. Who wants to see a machine shop? So we went into a machine shop, and they had some old lathes and drill presses and so on, and then they opened a door, and we stepped in there, and they're all computer-driven lathes and milling machines—the latest in anything you can buy. [laughter] This was in Magadan, which is at the very end of the earth. That's like flying into Denio. Fantastic! "Where did you get these?" [laughter] They were very proud of them. They should be. They were working, making things, I'm not sure what for. There are quite a few mines around there, so they were working on the mines.

They had some unique mining problems, compared to us. The permafrost north of Magadan is 2,500 feet deep. You go down in solid ice in the soil and the rocks. Everything is frozen for 2,500 feet. And that gives them some problems as it starts thawing when they open it up. We understood as we went along that the hardest problem they had was finding food for us, making sure that

we had food. It was collected ahead of time, apparently, so we never wanted at all. We had good meals. There always was beer and vodka on the dinner tables. I learned to like good Russian vodka. [laughter]

We had some grand parties. We exchanged songs in Magadan one night. One of the more charming ones was in Palatka Village. There was a young girl, twenty-five, and a couple of young men that kind of escorted us around, and in the evening we had a meal. Now, Sergei would translate for me, and we would give toasts. He said I gave pretty good toasts, and the translator that went with us was a good sport, too. She's a nice gal. Communication went fine. The Russians sat down on a little stage in this tiny restaurant, the only restaurant in all of Palatka Village. It wasn't a restaurant. They had a kitchen in this little hotel, and the local ladies came in and prepared our meals. That's how it was done there. These young Russian people sat down and started playing a guitar and singing Russian songs, you know, the sad Russian songs. Oh, just one of the most beautiful evenings I've ever spent. We all got up and sang "God Bless America." [laughter] That was an interesting event.

We went to Yakutsk, and then we went to a town—gosh, they've changed the name of it—right at the foot of the Ural Mountains, a town with a beautiful hotel, the only nice hotel that we stayed in, and everybody commented about how nice this hotel was. It's where Yeltsin is from. The name will come to me. We met again with geologists and mining types—the Bureau of Mines equivalent, the U.S. Geological Survey equivalent—and talked about this and that and economics. Had grand discussions, really. Most all the Russian technical people spoke English, not all of them, but many of them.

One of the interesting things that happened, we went out from this town to a copper smelter, and they were rather proud

of this smelter. We met before hand, and when we would meet with them I always asked, "Do you mind if we take some pictures?" because they can be sensitive about that. This time there were four guys sitting there, and I said, "Would you mind if we took pictures?"

Sergei translates. Sergei says something in Russian. They smile and say yes, we can take pictures. Later when I was with Sergei I said, "What happened?"

He said, "They were talking about, 'Can we let them? Should we?' I just said, 'Haven't we had enough of this secrecy crap?' And they said, 'Yes, we have.'" [laughter] Getting over the old habits.

Were the technical people in Russia aware of what was going on in Nevada?

Oh, yes. They got all the literature very well. Very well read. Russian Geological Survey has been one of the leaders in exploration devices in geochemistry, geophysics, and so on, and they get the literature. They might not be able to get the equipment, but, you know, they are well aware of what's going on in the world. They don't understand all the economics, because they have no experience with it. It's not because they're poorly educated. No one ever taught them anything different.

One afternoon in September it was nice weather. Late in the day they loaded us on the bus, and we weren't sure what was happening. We all fit on one bus. Off we went, and we went up to the top of the Ural Mountains. They're more like moderate hills. It's like going up the Appalachians or something. We got out of the bus, and there's a monument there with black and white rocks. The Ural Mountains is the division between Europe and Asia. I didn't know that till then, but I know that now. We all got our picture taken straddling this borderline. We were one foot in Europe and one foot in Asia.

While we were doing this, and enjoying ourselves, I looked over, and there were a couple of picnic tables—big, round, wooden tables with a wooden umbrella over them. And people were laying out and preparing some stuff. I thought, "Isn't that nice? Somebody's having a picnic over there." Well, when we got done fiddling with all our pictures and talking about Europe and Asia, we found out it was for us. They had laid out caviar and various cheeses and crackers and wine. The wine flowed, and the camaraderie flowed, and I made some great friends—brief friends, but great friends—and another tremendous experience.

Finally we go back to Moscow. We met with several government agencies then, and we'd been going day and night and getting kind of tired. I tried to put off meeting with a few of them, but God knows, you'll all be an international incident. [laughter] So I met with them. We all thoroughly enjoyed it. When we finally ended up at the airport, got through the airport, and got on a Pan Am plane and started back for the U.S., I thought, "I don't want to do that again."

It was stressful. Wouldn't want to get sick. God, don't ever get sick in Russia. It was enough. It was a different lifestyle. It was hard going. We were tired of it, tired of it. I had an opportunity to go back later, and it was interrupted, because the day we were supposed to leave is when Yeltsin stood on the tank in front of a building, and they were having a revolution in Moscow. So that got temporarily canceled. Then later, I couldn't go, but that group was met by the same geologist—Sergei Diatchkov took them around.

Well, I have to finish the story with Sergei. The leader of that group was a geologist from Idaho, who I knew by name, and another one who was on the trip was a geologist that came from Reno. Sergei wanted to get to the United States. He'd been here once on a trip and was at Berkeley for a brief interval and had been in South America

doing some work. He spoke Spanish, along with everything else. So the University of Idaho gave him half an excuse, and with a letter from me—I don't know if that helped or not—Sergei comes to Boise, Idaho. It was he and his wife and his son. His wife speaks English. So they were there for a while. I'll cut it short. He kind of wandered around, went to work for a fellow who was on the trip with me. Then he ended up with BHP, Broken Hills Proprietary, that had Kennecott at Magma. He's the geologist in charge of their Far Eastern work: Manchuria, China, Russia. So I see him now and then, and that is what he is doing. They want him to move to London, but he can't until he gets his U.S. citizenship. I think it's sometime this fall. I have to call him. When he gets his citizenship papers, they'll move to London, but not the boy. The boy is about ready for college now, and he's not about to leave the United States. [laughter] They've become U.S. citizens. He and I had great discussions in the air—we did a lot of flying—or early in the evening. He and I kind of hit it off, and so I gained a lot of insight into Russia, Russian people, and what things were like. He was a hustler, and very intelligent, and had been educated so his life was a little bit better, but for the average Russian life is hard—crammed together in apartments, you know.

And even as tourists, you had a sense of that. Even though you were well taken care of, you could see.

Yes, we did. That was a good question you asked about why I wouldn't want to go back to Russia. Why do I feel that way? I'll give you a little bit, but I'm having a hard time telling you, but I really wasn't anxious. I was not disappointed that I didn't go back the second time, because I can remember part way through there, saying to myself, "Bob, you don't have to do this again." It was very tiring, but it's some great experiences at the same time.

And an interesting contrast to what's going on in the United States mining industry, for example.

Oh, yes.

Is there anything else? I think we've covered a lot of territory, a lot of topics, a lot of descriptions of changes over time, and also of different philosophies that you've developed.

I guess it's the change in scale with major mining companies, and a lot of mining companies disappearing. The Kennecott I knew doesn't exist anymore. Anaconda is gone. Asarco is merging. There's a whole different ball game, but that's true of most all businesses. There's not the mom-and-pop grocery store anymore. There's not the mom-and-pop drugstore. The same thing has happened with mining. It's largely major companies. There aren't any family farms, either, come to think of it. To compete you have to be large, and that's what's happening in the mining world, too. As I say, they don't have small mines.

Very different from the 1930s.

Yes. Well, mining was important enough then, much smaller scale and much fewer people, but there was a weekly mining page in the *Reno Evening Gazette*. It just told you all about what was going on in mining. They don't do that now. I have thought from time to time of going down to the paper and volunteering my services and write some mining articles for them, so they'd get it right, but I'm not sure they would be interested. [laughter]

I would be curious to know if they would. That would be interesting. I thought that it might be unusual, the fact that they recently did a series on what was happening in

mining in Nevada. I haven't seen them do that on a regular basis over the past years.

No. No, they don't. It's only with bad news, you know, the price of gold going down, people leaving the houses. Good news isn't news, I guess. Bad news is news—it comes back to that.

Well, First Miss Gold used to be listed in the local papers, the local miners stocks. First Miss Gold was listed. We were on the NASDAQ then. When the stock spinoff took place, and the name changed to Getchell, it was accomplished by incorporating Getchell in Maryland. The lawyers told us we ought to be incorporated in Maryland, "We got great corporate laws to protect directors and other folks." So that's where it was incorporated, and then they moved the main office to Denver, because that's where all the financial types are—stock analysts and such. I didn't like that, but everybody else thought that it was the thing to do, and it worked out fine that way.

The local paper quit listing us, didn't list the stock anymore. So I called them up and said, "Why aren't you listing the stock? You list Placer Dome. They don't have an office here. You list Newmont. They don't have an office here."

"Well, you left. You just left the state, and I'm not going to list you." That was the financial editor.

I wanted to say, "You dumb jerk!" I didn't say that. [laughter]

But you thought that.

Yes, I thought that. Oh, the heck with him.

It's representative of change over time. The old newspapers had steady reporting on the mines in the small towns and what was happening, what was open, what was closed, the jobs.

Yes, the local papers. The Nevada Bureau of Mines, while I was there, had a clipping service. I'm sure they don't do it anymore; I'd be interested to know when they stopped. For a while it was done internally, and then we hired people, hired a firm to do it. We maintained scrapbooks, cutting out all the articles on mining to put in the scrapbook, and that was a tremendous resource for research work. You wanted to know the history of somebody, go back through that, but I don't think they do that anymore.

Well, I think I've run out of questions. Thank you very much, and thank you for your help with our project.

Thank you. It's been my pleasure. I've enjoyed it.

C. WARREN HUNT

VICTORIA FORD: *Today is November 23, 1999. I'm here with Warren Hunt at his son's home in Virginia City, and we're going to be talking today about Warren's experiences mining in Nevada. Let's start with just a little bit of information on your background. You mentioned that your very first experience with any kind of mining was related to your father. Would you tell me a little about that?*

C. WARREN HUNT: Well, yes. Father was a representative for various equipment companies in the West, and one of them was Merrick Scale. They sold a machine called a weightometer, which was new at the time and weighed continuously what went by on a conveyor belt. I would go out to mines with him once in awhile when I wasn't in school and see something of the mining industry, but that's as close as I ever came to it up till I got into geology.

Tell me the importance of that weightometer.

Well, I think it was the first time they could weigh and keep track of material that

was delivered from a conveyor, so it was obviously of great importance for mining companies.

New technology then, in the 1930s, this would have been?

Yes. We went into some places in southeastern California and southwestern Nevada. I can't remember just where they were at this point. That would have been 1934 or 1935. I was too young.

You were born and raised where?

I was born and brought up in San Francisco and Marin County. We moved to Marin from San Francisco in 1930 as a result of the crash, which caused my father's business to pretty well collapse. We owned what my family thought of as a summer home in Ross, and so we moved there in 1930. From there I went to a private boys school named Tamalpais School in San Rafael, and then to Cal Tech in Pasadena just as the war started. I expected to be off to war, but I was astounded to find that the services didn't want

me, because I had a bad case of acne, so I finished my education, which was concentrated into fewer years due to the war effort, and I got my degree in geology in February, 1945.

What led you to an interest in geology?

Well, I loved the outdoors. I used to go to summer camp in the Sierra Nevada, and I just thought that that was living, and I was going to do that. Geology offered that opportunity, so I went into it, and it worked out that way. I've spent an awful lot of time in the wilderness mapping both for oil and mining in subsequent years.

At any rate, when I graduated in 1945, I got a job with Standard Oil Company of California, and that was the only time I worked for a major oil company. I left after nine months. I just didn't feel that that was the life that was going to be of interest to me, and I might as well get on with what I wanted to do. I went to work for a small oil company, which was extremely successful, and learned a lot about the oil business in that period, and then went into consulting on my own right in 1948 at the age of about twenty-three.

So, things were rather quiet. I had a stint working in the Mediterranean, in Sicily, and then back in California in 1949 everything seemed to be rather quiet. Meanwhile, the oil business was coming up with big news in Canada, and I went to Alberta at that time. I've never really wanted to move away. Over the next twenty-three years my work was mainly in oil exploration, but I did a few mining jobs, discovered a silica mine in British Columbia near the town of Golden, which has been on production now for some time. I did various mining projects in the far north and British Columbia, northern Saskatchewan, and so forth, over the years.

In 1973 I had an unfortunate accident while teaching my younger son to cross-country ski. I slipped in an unfortunate way

and tore my face open on a jagged stump. The accident paralyzed me temporarily. Just at that time, the socialist Trudeau had undertaken a thing called the National Energy Program, which devastated the oil business in Canada. As I lay there in intensive care I thought, "This is quite a pickle. I've got to figure out something to support my family. What I need is a gold mine." The thought made me chuckle, but I thought, "Well now, that's an idea that just might be feasible."

In fact, I'd been asked to take over a little company called Swiss Oils of Canada, which had a property comprising a block of thirty-six claims called the Goldstrike, about three or four miles north of the Carlin Mine. I didn't really want to take over a company. I'm a geologist, and I don't like administration or stock markets or the people that populate those premises. So I had turned it down a few months earlier, but here I was thinking I need a change, and I thought, "Well, now maybe that's something I can do." So, even though I couldn't personally go out, I knew a competent mining geologist that I could send out.

It occurred to me that I'd heard a talk. In fact, I had been chairman of the Calgary branch of the Canadian Institute of Mines and Metallurgy in 1969, and I'd organized a talk by a man named George Potter of the U.S. Bureau of Mines, who had developed a new technique called heap leaching, which offered an opportunity for low-cost production of low-grade ores. The Carlin area was thought possibly to have this kind of ore, so I sent a geologist, a man named Guy Allen, out to the site, and he delivered samples to Potter in his Salt Lake City laboratory. Potter checked them out, and late in 1973 we got favorable results, indicating that the ore could be leached profitably. Of course, neither we nor anyone else at that time knew much about building a heap or the extraction process or recycling the carbon or any of those things, but I've never been a person to shrink from doing something that I

didn't know all about. So we ventured forth with a little money that I raised among some of the other oil people who sought some kind of a refuge from Mr. Trudeau's onslaught against the oil business. Thus it was that we set to work in 1975 to try to build a heap leach and make a little money in the gold business.

Was Newmont operating the Carlin Mine already?

Yes. I can give you some background on all of that. Newmont, if memory serves me correctly, started production about 1961, give or take a year. I think that's right. Their background in getting in there, as I understand it, was that they had had a motherlode mine. I think it was the 16-to-1, but I'm not dead sure. It was run before the war for Newmont by a man named Bob Morris. He worked for them as a manager. Morris had raised funds from some of his fellow Mormons to acquire and operate the Blue Star Mine, which is north of the Carlin Mine but south of the Goldstrike claims. Bob Morris had been working the Blue Star Mine before I came on the scene in 1973. Sometime before 1961 he wanted to get backing from Newmont, so he invited Fred Searls, the head of Newmont, to come and look over the potentials at the Carlin Mine area. There was an old boy named Popovich, who every year would wash a little placer gold on Sheep Creek, which is just north of the present Carlin Mine. Old Popovich was a Yugoslavian, and when Morris took the Newmont people in there—this comes to me from Morris—he said, "Popovich waved his arm and said, 'That whole hill is gold ore.'"

The way Morris puts it, within a day there were aircraft and helicopters all over the place, and they staked the whole countryside. So that's how Newmont came in, according to Morris. A few years later, Morris's efforts running the Blue Star led to disaster. One of his men accidentally set fire

to the countryside. He let the fire get away. They were sued by the T Lazy S Ranch, a big ranch owned by some people named Thornton that had checkerboard Southern Pacific land. The old man, according to Morris, was a swaggering, buccaneer type. He used to walk around with two pistols at his side, and he treated people in that manner—bullying them. He was chairman of the board of Litton Industries, a Fortune 500 arms manufacturer, and I guess they felt that they had some sort of a special right to bully people around, but anyway, they were utter misery in the countryside. They even got Newmont painting numbers on the tops of their cars, so that the aircraft that belonged to T Lazy S could survey who was in the area. They put a locked gate across the county road, if you will. How they got by with that kind of stuff, I don't know, but we all had to go to them, hat in hand, and try to mollify their ridiculous requirements. At any rate, they sued Morris's Company and took over the Blue Star Mine, which then they dealt off somehow to Newmont.

When I got there, Morris had a new mine called the Bootstrap, which is north of the Goldstrike Mine, and they were trying to make a little money there. There's several years between these events. The Bootstrap is quite a bit further north, whereas the Blue Star actually adjoins the Goldstrike to the south. At any rate, that's, as I understand it, the background of how Newmont got into the area, and the history of the Morris Company, which at the time I got there was called the Bullion Monarch Company.

Now, our interest arose first from a repost written by a geological firm named Hager, Seeley, and Sweet. Dorsey Hager was a well-known Salt Lake City geologist who had written a book on oil property appraisal that I knew about. I didn't know Seeley, but Seeley is a mining name, because at my institution—California Institute of Technology—the geology building is called the Seeley Mudd Building. So I don't know

whether it's Seeley and Mudd, or whether Seeley was a first name there, but anyway, you don't run into the name very often elsewhere. That firm had looked at the Goldstrike claims back in the mid 1960s and had written favorable reports on them.

The Goldstrike is different from other properties in the Carlin district. I should back up there, too, and talk about geology a little, because when that district got started—and there was gold throughout this hill mass, as old Popovich had said—new theories had to be developed to explain the occurrence. The gold mineralization occurs in sedimentary rock under an overthrust sheet comprising older rock of the Roberts overthrust. The sedimentary rock with the gold is a younger rock exposure in the middle of older rock that has been thrust over it, a configuration called a window in geology. The ore is permeated with petroleum and elemental carbon, char.

The theory that was developed to explain the observed facts was, I believe, originated by the U.S. Geological Survey people in Denver. Oil and gold had all been part of the original deposition of the carbonaceous Devonian/Silurian sedimentary sequence, syngeneses in a syn-depositional sequence. That idea was very strongly promoted and advocated in many USGS publications in the 1960s. Based on that theory, there shouldn't be any ore in an overthrust sheet, which on the Goldstrike claims is the Vinini formation of Ordovician age. Neither should there be any ore in late stage intrusives—igneous rock, granite, intruded into the sedimentary series. The Goldstrike ore occurs in both ages of sedimentary rocks as well as in an igneous body, a granitic body occupying most of the Goldstrike claim area on the surface. I know now that Newmont had previously looked at the Goldstrike back in the 1960s, and they didn't like the grades shown by their assays or the granite habitat, apparently, because they didn't make any move to acquire the property.

When I got on the property, it became evident to me that the theory that was advanced by the U.S. Geological Survey as to syngeneses of the gold and petroleum was incorrect. Rather, as I saw things, the gold had actually been emplaced in a late stage, in the Tertiary, after the intrusive had come in, whatever age that was. It was generally thought to be early Tertiary, but I'm not certain of the precise age. My conclusion as to the late arrival of the gold in the granite also invalidated the idea that there was no likelihood of gold in the Vinini formation.

I also recognized that the Rodeo Creek Valley in which the Goldstrike is situated was basically a volcanic vent in which Tertiary volcanics rest against the sedimentary and igneous rocks wherever they came in contact and had been laid over them. So this gave the impression that the gold and volcanics were related and had arrived at something like the same time. That, actually, is the normal thing to anticipate in other parts of the world, so it wasn't such a revolutionary thought. It was just that the opposite had been promoted so strongly by the U.S. Geological Survey. I think they were absolutely wrong. After many years, sometime in the late 1970s or early 1980s the USGS did publish a statistical study that effectively reversed their idea of syndeposition. They had demonstrated statistically that there was no relationship between the gold and the carbon in the rock. One was not dependent on the other. So, they gave up their earlier theory. Well, at any rate, I've told you how Newmont got into the area, as well as I know.

How Swiss Oils got into it is another story. It started with the Hager, Seeley, and Sweet report that I mentioned. I don't know who the promoters were who put together Swiss Oils with the Goldstrike claims, but Hager, Seeley, and Sweet were in there for some shares, and there was an old boy named Freddie Anderson who talked to me as the promoter. He was a really interest-

ing, colorful person. He always reminded me of a chipmunk, because he talked so fast. He had things like relics of Jessie James, who had escaped the U.S. Cavalry by running into British Columbia, and somehow Freddie Anderson had a lot of his artifacts—holsters and hats and I don't know what all else.

There was a company called East Utah Mining that had a prior claim to the Goldstrike property. I really don't know much about them, but David Clegg was its president. They claimed a royalty on the Goldstrike that Hugh Scott Douglas, the man who brought me into the picture, said they were not entitled to. East Utah was supposed to have done something they didn't do. Thus, a bad relationship with Swiss Oils had developed. I can't remember the details at this point, but East Utah was very persistent about that royalty, and in later days they made it stick. That royalty ultimately was sold to Franco Nevada Mining, a highly successful company based on the revenues from that royalty. It was a 4.5 percent royalty on the Goldstrike claims, which is a really big royalty in mining.

The man who had come to me originally, Hugh Scott Douglas was a Scottish lawyer, a fine man. Hugh asserted that the East Utah royalty was not valid, due to some non-performance on East Utah's part, but, ultimately, East Utah made it stick. Douglas had wanted me to run Swiss Oils itself, but I didn't want to do it. I said, "Well, I'll try to get the mine in production for you and try to make some money on it for all of us, but you run the company, because I don't really want to." Well, the Swiss Oils board were very, very inept at running that company. Other than Douglas, there wasn't anybody there of any common sense, as far as I can see. An unfortunate thing happened in 1976. Douglas was killed in a car accident. That left the company in limbo.

At any rate, I set out in 1974 to build a small heap leaching operation. In that first year, my efforts produced a little gold, but

not what we had hoped for. I've got a receipt for the first gold sold, which I can hand over to you, if you want to copy it or keep it. That would have been in the winter of 1974, the very first gold sold. Our heap didn't percolate properly. We weren't able to load the carbon as heavily as we had hoped, and we ended up just selling the carbon. That's what the receipt is for, the gold content of the carbon. I forget what we got for it—it's on the receipt—but much less than what it cost us.

The idea then was to do a better job, to do a bigger leach next year, and see if we couldn't iron some of these problems out. I can't remember very much of the details, but the second year, 1975, was a bit better. We got an ingot of gold out of it. We had a laboratory at that time. I hired a man named Sid Lindauer, who was an experienced gold refiner and good laboratory man, and I had an Englishman geologist named John Hogg working for us, who subsequently worked for Barrick. We had a crew of about sixteen. We were producing, but again, not as we had hoped. The main hindrance appeared to be lack of the percolation that we expected to get through the heap. I attribute this to having loaded the heap in a way that compacted it.

My backers in this second year were not so understanding as those in the first year had been. They were Calgary oil people who turned out to be pretty much, shall I say, not very good friends. In fact, I would describe them as bullies. They insisted on hiring a man to do the job in the next year, a man that I knew from personal experience was both dishonest and incompetent, so I dragged my feet, but I shouldn't have. They offered me a royalty, and I should have taken it. Instead, I wanted to get away from them, and I said, "Oh, I've got some claims." By this time I had assembled a great large block of claims to the south as part of our joint holdings. It must have been at least two thousand acres, I think, of claims north,

northeast, and northwest of the Newmont Carlin Mine. I said, "I'll take the new block, and you take the Goldstrike claims, and we'll part company." They agreed. There was an underground working there on the new property. It was called the Big Six Mine, and it had some pretty good ore in rock of the Vinini formation in the overthrust plate.

And that Big Six was being operated by who?

No, that was a defunct mine, having not operated since World War II. I'm not sure, but operations there likely were in the 1920s or earlier. See, the whole district was much older than Newmont. It was called the Lynn District, and there were people trying to placer the little creeks up there, even before Popovich showed up after World War II, and there was also that underground working called the Big Six Mine, which was owned by a man named Bleazzard from Salt Lake City, pronounced "Blazzard." And there were some other holders in there. I've forgotten them all but one named A.B. Thomas. Blake, as he was known, was a Salt Lake City lawyer who had made money fresh out of Stanford in 1924. He had driven to Beatty, Nevada, bought a mining prospect where the owner had become discouraged, and, within two or three days of extending the workings, ran into bonanza grades of ore. He sold out promptly and thus launched his career as a mining promoter based in Salt Lake City. Blake helped me piece together the titles to many old claims to make up my two thousand acres. I put all this together, and I thought we had quite a good potential for finding a good deal more ore.

The two thousand acres of claims that you put together, which was both north, northeast, and northwest of Newmont's Carlin Mine, included this Big Six underground property?

Yes, but it didn't include Goldstrike. Goldstrike was off to the northwest from there. We had one quite good showing on the new block of claims, and I figured we could mine that, although we didn't know how deep it would go. At that time, we didn't have any drilling to work with, but the showing was quite strong. It was quite rich ore.

I wanted to get away from these people that I didn't like at the Goldstrike—a man named Kendall Jensen and his assistant, David Nicholson. They had a company called Pancana Mining, and they took the Goldstrike into Pancana, simply ignoring Swiss Oils, and they tried to run it with this man that I knew was incompetent and dishonest, named Darrell Houdascheldt. They limped along for a year or so with him and then sold out for thirty million dollars, as I understand it from the grapevine, to a company from Denver, an engineering-oriented company named Western States Mining.

Western States was quite competent. They put in a big heap leach on the Goldstrike and operated for several years. I believe they made good money, but I don't think they ever did any drilling. Barrick approached them, or maybe they approached Barrick, I don't know, but anyway, they made a deal where Barrick took a drilling option, and it was in that drilling option that Barrick discovered the rich ores that underlay the surficial leaching ores. Those deeper ores are making the mine today. It always seemed to me like it was self-evident that ore at depth was what we should look for, but when I had to promote funds in 1973, it was too hard to promote money for gold at thirty-five dollars, and even in 1975, when it had risen to around sixty or seventy dollars, you couldn't really get people enthusiastic about putting money up at those prices. So that's why we went to leaching. We thought, well, for a very limited outlay of money, we can show that we've got something, and then backers would lay out

some more money. Of course, when we failed to make money in the beginning, well, that hope fell to pieces.

I want to talk a little bit about the heap leaching as a new technology, at the time that you were working on it. Did you have access to people with expertise on heap leaching to help you figure out how to do this?

No. We did just what came naturally. I would rate my own abilities that way as not adequate, particularly, in view of the results.

Because things like the compaction problem—they've developed that to a point now where they know how to deal with that. Is that correct?

Yes. That's right. They use stackers and things. I don't know the details. I'm not an engineer, but, obviously, they're preserving the permeability of the heap.

Was the compaction the only problem that you ran into with this new technology?

Oh, no. We had to figure out just what equipment to use and how to make the flow go where it was supposed to go, and there were a lot of little decisions like that that took a lot of effort, but I wasn't aware of any other feature that I think defeated us. I think it was the compaction.

What were some of the kinds of equipment that you started using?

Well, you start with little plastic hose and clamps, and you buy your chemicals from the chemical companies and mix them up. At first we mixed them manually, but then we put in a tank the second year and prepared the solution we needed there. You need a laboratory. You need to have your

controls over your pregnant flow and your new water. Everything has got to be laboratory controlled, and assaying has to be done overnight. The basic gold leaching and recovery concept is pretty obvious to anybody who understands the chemistry. There's still a lot to do making things work, and all the time you're fighting the weather. The Nevada weather in winter is pretty fierce out there on that site.

Because you were operating year round at that time?

No, we'd only operate in the summer, but we still wanted to get going as soon as possible in the spring, and so you're out there beating around in the mud, in the wind. So anyway, the Goldstrike got away from me through my own volition. I was anxious to be rid of my unsatisfactory financial partners and made the decision to take the other property and leave them with the Goldstrike. I'm not blaming anybody else for my decision. The project was a great experience for me.

I went to work on the other property, which I called the Bullion Monarch property after the original owners of the claim that had the good showing. I got quite a big leach started there. I hired a Salt Lake City engineer named Likens, who was supposed to be expert at it. We called the new mine the Bullion Monarch Mine, and I can show you a lot of pictures of it, too. I've got more pictures of it than of Goldstrike, even. It is about a mile and a half northwest of the Carlin Mines. That would make it just about due south of the Goldstrike, maybe two miles, three miles. We put in a deep pit there. We had a hundred thousand tons, I think, and loaded it on the heap leach pad, but this engineer put the heavy equipment on top of it again, and I think we compacted it, and it wouldn't percolate.

So then, my partner at this time was a small oil company, and they wanted to put

in a mill, and I said, "Well, that's fine, but I prefer to take a royalty at this point." So I took a royalty, and they milled the ore that was in the pile that had not leached. They only leached that ore and never developed more. I don't think they were able to develop any further ore, because I don't think they were very good geologists, quite frankly. I think there was a lot to be done on that property that they probably didn't do, but I don't know exactly what they did. At any rate, they sold out then after a couple of years, and at that time I sold my royalties and made some money.

You said that when you first went into this area outside the Carlin Mine, that George Potter was in Salt Lake City. Is that correct?

Yes. He worked for the Bureau of Mines.

So you had him check out a sample of the ore?

Yes. He ran tests on it.

And he was also, according to your understanding, the person who developed the heap-leaching process?

Yes. I know that for a fact, and it's in the publications of the U.S. Bureau of Mines.

At the same time that there was talk about the heap-leaching technology, were you also aware of the theories about the microscopic gold in that area?

Well, yes. That was one of the reasons the heap leach was developed. If the microscopic gold was largely on fracture surfaces that could be accessed by leachate, then that microscopic gold could be picked up. Heap leaching in this way avoided all the cost of grinding that other milling systems would require. It was a brilliant technique for that kind of low-grade and microscopic gold ore.

Do you remember what your samples were coming back, the ones that you had George Potter check?

Well, not in detail. I think they averaged somewhere above a tenth of an ounce per ton. I've got all the old assays; I could look those up easily. If you want to know, I could give you exact numbers, but that's the sort of order it was.

I know ownership on mining claims can be very convoluted, almost. At that time you worked for Swiss Oils?

Well, I wasn't actually working for them. We were sort of in partnership. I was to get a share of it, and they were to get a share. I don't remember what. I said I will raise the money and do this, and your share will be such and such.

I see. So you weren't? actually employed by them.

No.

And were there other companies involved? You mentioned East Utah Mining.

Yes. East Utah claimed royalty interest against the interest held by Swiss Oils, and this Pancana outfit—they claimed Swiss owed them money. Now, Hugh Scott Douglas told me that that's absolutely untrue, and I'm sure the man knew what he was talking about. That became very critical later on, because after I was out of it I would often see these directors of Swiss Oils, whom I have described as such idiots, and I'd say to them, "You should be asserting your interest. Barrick is in there producing gold. Are you getting your share?"

"Well, we got to do something about that," they'd say, or something like that. Then, they'd not do anything.

So, it got to such a point that in the winter of 1988-1989, I said, "Look, this is ridiculous. You say you've never signed over those Goldstrike claims to them, and yet you're getting nothing out of them. Let's get the documentation out." There was this lawyer named Webster MacDonald, who claimed he had an interest through Swiss, so I said, "Well, you organize it. Get these people all together."

We met in his office, and it was an old boy, Elmer Kaufman, who was President of Swiss Oils and the key to the enigma. He was either irresponsible or perhaps utterly stupid. The man was an old vet, and he had shrapnel in him, and his health was so bad you could say to yourself, "I don't know whether he'll live another three months." Elmer was the president of Swiss Oils. The company had about \$1,500 a month coming in on oil revenues, and he was living on that.

The attorney, Hugh Scott Douglas, was killed in 1976. There was a new attorney, Webster McDonald, that said he had interest in this, that I got to organize this meeting. Pancana threatened Elmer. They said, "If you do anything to upset things, we're going to sue you."

Well, Elmer couldn't afford a lawsuit, so, ignoring his responsibilities to shareholders of a public company, he didn't do anything, but Elmer was good at keeping documents. He had all the documents, and they were all laid out in Webster McDonald's office, and it was transparently obvious that Elmer's assertion that, "I have never signed a quitclaim to these claims to Pancana," was true.

Swiss and Pancana had signed some earlier agreement on some peripheral matter. I can't remember just what, and what had happened was transparently obvious when one examined the documentation. Pancana had taken the signature page from that earlier document and applied it to the one Elmer had refused to sign. After being frustrated in their attempts to get him to sign

the quitclaim, Pancana had attached the signature page from the earlier document on to their new document for transfer of the claim titles, which they then registered in the courthouse at Eureka. That title now is Barrick's entitlement to the Goldstrike Mine, and it could have been upset 100 percent, so I said, "Well, now, there's your evidence. You've got to file suit against these people." Of course, at this point, it's in Barrick's name. Pancana had sold to Western States Mining, and Western States had sold to Barrick. So both Western States and Barrick were innocent of any wrongdoing. Pancana had falsified that transfer, and so you know what I think of them. [laughter]

So, this is a glitch in the legalities that could still cause problems?

No. The problem was in Alberta. The agreements had all been signed in Alberta, so it would come up in Alberta court—or would have come up. There is a statute of limitations for filing this kind of action in Alberta, and for Swiss Oils that ran out on the thirty-first of either July or August, 1989. So Swiss Oils' directors filed a three-billion-dollar lawsuit against Barrick on the thirty-first of whichever it was, July or August, 1989, which was a Friday. On Saturday, all Barrick's top lawyers from Salt Lake City and executives from Toronto were in Calgary for a meeting, "We got to have this lawsuit removed by Monday," they demanded.

Well, I said to the Directors of Swiss, "This is perfect. You've got them where you want them, when they want it that much. Don't settle." Completely ignoring my advice, they settled on the Saturday night for three hundred thousand dollars on a three-billion-dollar lawsuit! Can you imagine such ineptness? What had happened, however, is that it wasn't such a good lawsuit after all, because the old boy, Elmer Kaufman, had died seven days earlier.

In this meeting that I was in with them, where the fraud was revealed, the lawyer, Webster McDonald had said, "Look, Elmer, we want you to give us perpetuating testimony that can stand up in court to this effect, if you aren't around."

And Elmer replied haughtily, "Oh, I'm going to be around. Don't worry about that."

Well, we all thought otherwise, and we were right, unfortunately. The Swiss lawyers handling the case said, "Well, with him around, 95 percent sure, we can beat this. Without him, maybe 15 percent, and with a company like Barrick to challenge, you've got big costs coming up. There's no way you can afford it. You've got to settle." But they could have got more than three hundred thousand dollars.

When Elmer filed the lawsuit, he was the president of Swiss Oils. Were you still in a partnership with Swiss Oils, or had you bowed out?

No. I had bowed out. I had said to myself, "Well, this other property is much bigger, and I've got some rich ore on it, richer than I've got showing on the Goldstrike, so I just bet on the wrong horse."

I see. And took your chances.

Yes. Well, you have to do that in this business.



When I was talking to John Livermore and Alan Coope, who were the geologists that worked for Newmont at the time that the Carlin Trend was located, they talked about eighty acres of Popovich property, and I'm wondering if that's the same hill.

Yes, I'm sure it would be. They probably bought him out. Popovich was on Sheep

Creek, which is immediately adjoining Newmont on the north. It's Sheep Creek that Newmont damned for their tailings disposal.

I want to make sure I understand the relationship of Bob Morris, then. He had the Blue Star, which went to the T Lazy S Ranch, and then Morris went on to the Bootstrap Mine. Is that correct?

Maybe not right away, but later on. That's where he was by the time I showed up there.

I see. Did you end up working with him?

Some of these claims that I put together, adjoining Newmont on the north, had been owned by Morris's Bullion Monarch Company. And so, I made a deal with them. That's why I called it the Bullion Monarch Mine, because it was on their land.

At any point, did you work directly with Newmont on anything?

No. No.

They were always the next property over, and they were already in operation when you were there?

Yes. At that time we were having trouble, and I could see I was going to have to raise some more money, and I didn't have any good means to do it. I offered the Goldstrike to Newmont, and they refused it. They could have bought it. They could have come to me and said, "We'll give you a hundred thousand dollars for it," and we'd have jumped at it.

Was Fred Searls still in charge of Newmont at that point?

No, I think Fred Searls was Bob Morris's friend, and he had passed away by this time. Morris speaks very highly of him. I didn't

know him. Morris says that the problem with Newmont has arrived with the later management; they're not up to Searls's standard.

So, when you were offering the Goldstrike to Newmont, who would you have been dealing with? Do you remember?

Oh, just the local people. There was a Newmont geologist named Larry Noble, who died an untimely, early death. I can't remember why—illness of some sort. He just, you know, gave a wave of the hand, "They're not interested," but they had actually sampled it earlier, so they thought they knew about it, and they were imbued with the theories that were wrong, as far as I'm concerned. Livermore was one of the geologists that put those theories together, and he was quite wrong, I think, but then, we geologists always disagree with each other. [laughter]

You said at some point Pancana sold to Western States Mining, and then Western States Mining sold to Barrick, and Barrick took a drilling option? Would you explain what that means?

Well, that means that you'll offer to go in and spend so much money—let's say, half a million dollars—on drilling the property, and you have an option to buy the property for, say, five million dollars. They can't sell the property to you for five million dollars unless there's something demonstrably there, so the drilling is supposed to prove that up. That's a standard kind of a deal that mining companies offer. They want to put the money in the ground before they have to pay for the property. Make sure it's worthwhile.

So that's how Barrick finally came into the Goldstrike?

Yes. They had geologists with a sense of potential value, which I would say on the

evidence, Western States didn't have. Western States was, as I understand—and I don't know them personally at all—an engineering-oriented company, and they did a good job with the heap leaching, which we didn't do. So they made a good thing out of it, anyway.



Well, as I mentioned earlier, the popular idea that came along at the time the Carlin Mine was developed was the idea of syngensis, where sedimentary rock was deposited. Oil was manufactured out of its fossils, due to what's called biogenesis at the pressures and temperatures of depth. The gold was thought to have been precipitated by the carbon content of oil, or by native carbon—char—which might have been deposited in the rock. As I've said, I think that is a completely wrong concept for the origin of Carlin gold, and I've gone on beyond that—I've written two books on the subject. They're not a direct outcome of the Carlin work. They're an outcome that has to do with my general geological background and research into violent processes which includes, particularly, volcanism. I've recognized in the field that there have been enormous exhalations of gas from the earth, so enormous that they would have to represent a gas that could be hidden in the interior of the earth. The only gas that could be hidden in the interior of the earth in quantity is hydrogen, because it permeates the mineral lattice structures, and it actually can force itself inside the atomic electron ring of a metal and densify the metal. In densifying the metal, it would have the effect of liquefying it, as well, because hydrides behave like liquids or plastics, like toothpaste, but they still would be malleable and liquid-like.

So, I think that the enormous volumes of gas that have been exhaled from the earth . . . and I use as an example the volcano called Gros Brukkaros in Namibia. It

is three kilometers in diameter—the crater. There's not a bit of volcanic rock anywhere around. Nothing but gas came out of that crater, and anybody with any background in gas flows, which we have in the oil business, would find that completely boggling. There's no possible way you can imagine how much gas it would take to blast a hole in the crust of the earth to leave a three-kilometer diameter crater. I have estimated that a blow of hydrogen through such a large crater would consume the entire oxygen content of the atmosphere within three days. At any rate, the Gros Brukkaros crater shows that hydrogen is hidden in the earth, and when it comes up, it may be as methane, as native hydrogen, or as metal hydrides. It's these metal hydrides that are the source of gold and many other metallic deposits, because they are fluid.

The metal hydride that's the most important to the entire earth is the hydride of silicon, which carries the same amount of heat as methane when it burns. Silicon hydrides are called silanes, and, like methane, have the formulas SiH_4 , Si_2H_6 , Si_3H_8 , and so forth. The silanes are combustible and react with water and oxygen just like methane, ethane, propane, and so forth. They carry about the same amount of chemical energy as the equivalent hydrocarbons. When they burn, they create volcanic ash, and here we're sitting in Virginia City, which is a mountain of volcanic ash. This is the combustion product of silane that came from the interior of the earth, a volcanic product picked up by hydrogen trying to escape. And it's this volcanic product that burst through in Rodeo Creek Valley, not in the quantity that came out of Gros Brukkaros, by any means, but just enough to put a lot of ash on the surface, fill the Rodeo Creek Valley with ash, and perhaps allow a little gold mineralization to percolate into the adjoining sedimentary rocks, or the little granite pluton on the Goldstrike.

My concept of ore deposition is not generally known at this point. My books are widely ignored, but they are available right in Reno. I have an agent here named Conrad Mollath, who has a son who's a lawyer, and he's on Liberty Street. My books are called *Environment of Violence* and *Expanding Geospheres*, and they are followed up by another pair of publications that I published: one by a Russian, named Vladimir Larin, called *Hydridic Earth*. Larin had been working on hydrogen geology for twenty-five years before I started, but I didn't know about him until after I'd written my books. When I found him, I published his book, also. Ours is new geology. It changes everything. Geologists who go ahead with nothing but traditional Lindgren vein geology or ideas such as the U.S.G.S. idea of syngensis of ores are deficient, and they would do well to consider the aspects of hydrogen in the dynamics of the earth.

I was wondering if your books had been used at all in courses on geology.

Well, I've been told by some foreigners that they have. A man in Greece said that he was using them, and some others, but you never know. A few people will treat it as a curiosity, but then a professor may say, "Here's something that's of interest," and pass it on as an alternative way of looking at things, but most people haven't got enough time to appraise all the things that are in front of them, and there's a lot of reading and background to do. So it takes a while to get these things established. I'm not hopeful that that's going to be done in my lifetime. [laughter]

Have you worked at all with Mackay School of Mines or any of the professors there?

No, I haven't. I know a few of them at a distance, and I know a lot of professors in

Alberta and some other places, but they have a life of their own. You know, they don't really mix with ordinary geologists. They come out with their idea. They teach things like plate tectonics, which I think is a lot of baloney, utter baloney. I mean, there's lots of evidence, but the evidence can be better explained by an expanding earth, and the people that keep propounding some of these things won't look at alternatives.

So, as you know, I'm also in oil. The hydride of carbon is just another one of the hydrogen phenomena of our earth. Theoretically, in my opinion—and I've published papers recently on this subject—petroleum is an organic product produced by bacteria and archaea that act on gas—natural gas, methane—that escapes from the interior of the earth. When methane is available, bacteria will take hydrogen away from it. That leaves higher carbon numbers, so your CH_4 becomes a CH_3 . If two CH_3 s get together, you've got C_2H_6 plus two free hydrogen atoms, or a free hydrogen molecule, actually, H_2 .

This goes on all the way to coal, the ultimate stripped methane, so I say petroleum is a mixture of the anhydrides of methane, and I renamed my oil company Anhydride Oil Corporation, just to help publicize the name. The petroleum is not a fossil fuel. Nevada's production at Railroad Valley and related areas doesn't come from the little tiny Chainman shale. It comes from deep in the earth as methane, and you've got lots of bacteria down there, many of them at very high temperatures above the boiling point of water, acting on it and stripping hydrogen away and making petroleum, so some petroleum reservoirs should be refilling, and there have been papers written to that effect, that the Middle East fields are doing just exactly that, but I think it's a little too early to be really sure of that. There is evidence of increasing reserves, that the pressures don't drop as they're expected to,

and there are also large amounts of petroleum to be found in granitic, and in the case of Nevada, volcanic reservoirs.

So, instead of being a finite resource, it's a renewable resource, according to the theories that you worked on.

It's a renewable resource, yes. We may deplete reserves in places where they're not renewing. They're not necessarily renewing in all places, because the hydrogen emissions are very irregular worldwide, but in some places where reserves are particularly prolific, I think they are likely renewing, and that would be Saudi Arabia, the Persian Gulf area, and our own Alberta Tar Sands, which are the largest known resource of petroleum in the world today. There are 2.3 trillion barrels in place there, and nobody, in my opinion, can adequately explain how that arrived there. I have a two-million-dollar well drilled into the granite. It's waiting to be tested, and all the logs indicate that we're going to have a big well there. That's what I've been working on, but it's working uphill because geologists just aren't willing or ready to accept a new theory that's so drastically contrary to what they've been taught and worked with all their lives.

Was your time in Nevada your only time working in gold? Have you primarily worked in the oil industry the rest of your life?

Yes. Well, I took twenty years away from oil. Nevada was about seven years of it, and then I went to California, and I developed a mine over there at Redding, spending seven years, and then working on my books a further six years. It's a vein-type mine; it's not a Carlin-type mine. I was in Nevada 1973 to about 1980, and then I was working there in California from about 1980 to 1987. I've been working on my books and in house-

keeping my previous interests in Nevada and California up until about 1994. I mean, I'd just make trips down, and try to do things in Alberta, too. Did an awful lot of driving.

Well, you can look at my website on my books, www.polarpublishing.com. I've published my anhydride theory, first in a conference on oil and granite held in Kazan, Tartarstan, Russia, in December 1997; and then at a conference on coal seam gas and oil held in Brisbane, Australia, in March 1998. It's out this month, November 1999, in the *Canadian Journal of Petroleum Technology*. So I'm persistent in getting it places. Of course, I don't care if people believe it or not. If my well comes in at the Athabaska Sands, well, I'll make a billion dollars, and they can take it or leave it. [laughter]

Right. Your theory will be second, yes?

Well, ignore it at your peril. [laughter]

Even though you didn't do a lot of work in that area, it seemed to you like the Goldstrike was a viable mine area, and you tried to see if Newmont wanted to buy it at one point. You always thought that the ore was there?

Oh, yes. I never had any doubt that it was a heck of a good property, but you're always just hunting blind. It's like walking in the woods. You don't know whether you're going to come upon a moose or not, but you know you're in moose country, and you've got the right kind of equipment for it. That's the analogy. We call it "elephant hunting."

Well, thank you for your interview. I appreciate your contribution to the Nevada Mining Oral History Project.

VICTOR KRAL

VICTORIA FORD: *Today is September 17, 1996. I'm with Victor Kral in his home in Sparks, and we're going to be talking about Silver Peak, Nevada. I think first, Vic, what we want to start with is your birth date and where you were born.*

VICTOR KRAL: I was born August 7, 1911, in Pasadena, California. From Pasadena my parents (and I, of course) moved to Huntington Beach, California, and I was there, I guess, until about 1919. I was just about eight years old. I was kind of a sickly child, and eight years is when I started the first grade. I had no problem there. Scholastically, I caught up without any problem. There were several times in my life when my parents went to San Francisco and stayed there maybe for six months or something like that and then moved back to the Los Angeles area.

Was it your parents' occupation that caused them to move? Do you know why they moved?

I guess they just thought they might find conditions better. They were both tailors, and they worked at home. One of my early moves was to what is now referred to as the Watts area. It wasn't a fancy area by any means, but it was not like it is now.

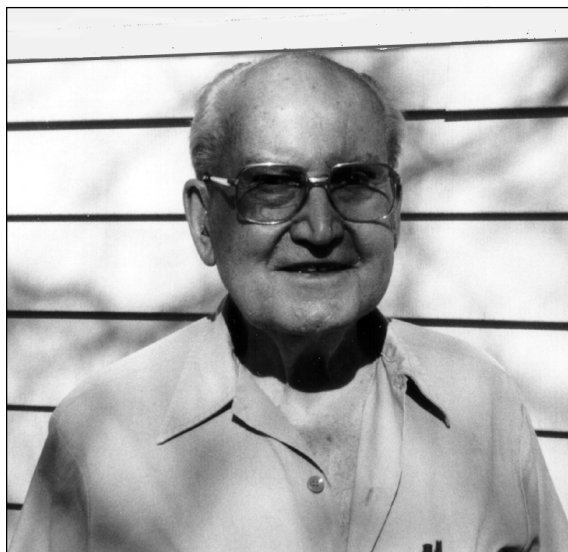
It was a safe place to live still?

Oh, yes, very safe.

How did you end up in Nevada? Did you come here with your parents or on your own?

No, I had a half-brother, and somehow or other we had lost track of him for about six, seven, eight years. Through my inquiries I finally found out where he was, and he found out that I was looking for him. His wife corresponded with us, and finally I hitchhiked to Reno. That's where he lived. I was sixteen.

Sixteen. Did your parents know you were going to do that?



Victor Kral

Oh, yes. Well, in those days, why, hitch-hiking was no problem for young people. I visited Reno one weekend, and I liked it so well, and I had an opportunity to go to school here, of course, so I think it was about a week or two later, why, I moved to Reno with all my belongings that I carried in a very small satchel the size of a good-sized briefcase. [laughter]

You didn't have much.

No, I certainly did not.

You said you had an opportunity to come to school here. Were you finished with high school at that point?

No, I had my senior year left, so I spent my senior year at Reno High, and Reno High at that time was where one of the gambling clubs is now, on the corner of West and Fourth and Fifth, I believe it was. I graduated from Reno High here in 1928. I was living with my brother and his wife then. Then from high school, I was worried about my grades. I didn't think I could get admitted to the university, but a fine gentleman who was principal of Reno High at that

time—Otis Vaughn, well-known in the history of education here in the Reno area; Vaughn Middle School is named after him—went over my credits and figured out that I just barely had enough to get in, so, thanks to him, I started the university in the fall of 1928.

Were you still living with your brother, or did you go live on campus?

Yes. I was living with my brother.

As a freshman, did you know what field of work you wanted to go into?

I knew that I wanted to be an engineer, but I didn't know what, and I wasn't very long at the university, a month you might say, when I realized that I wanted to go into civil engineering. So I started in civil engineering. After my freshman year I was looking for a summer job, and I got acquainted with somebody at the Mackay School of Mines, and I found that there was work to be had at Ruth, Nevada, in the Ely area. I went there that summer. That was the first time I had worked in an underground mine.

What kind of work did you do that summer?

Well, I first started helping a timber man. Timber man is replacing or putting new timbers in the mine. That's how I started out, but I'll have to give the company much credit there; they moved the students around quite a bit, so they'd get a pretty fair idea of what it was like.

Was it part of your education to be working there?

No. Just a summer job. The company was education-minded, in other words, and

that company, by the way, was Nevada Consolidated Copper Company, which later became Kennecott. I spent the rest of my time working as a brakeman on the ore trains. It's interesting, thinking back, that the ore trains were a very dangerous operation there, because there was very little space between the timbers and the ore trains coming by, and they go relatively fast. I'd say they're going ten miles an hour or something like that, which is fast for a train underground. Very little clearance. You have to stand between the timbers as the train's coming along. Of course, if you stood between the timbers, considering the timbers there were about ten-by-tens, why, there was a fair amount of clearance there, but I can remember a few instances where it was close and quite dangerous, and that mine—the Star Pointer shaft—was using the caving system. That means the ground is moving all the time, and, therefore, the timbers are being crushed and have to be replaced as you go along, and once in a while you get into some part of a drift where they were a little bit behind in replacing timbers, and it almost closes in. I recall one particular time I was walking through one of these drifts, and, suddenly, right behind me the whole back came down. If I had been there, why, it would have crushed me, of course. I was lucky.

When you say caving system, was it planned that it caved in afterwards?

Yes, it was planned that way so that you get the ground to gradually cave, and then you have ore chutes that go up into this caving ore, and you draw the ore through the chutes into the drifts below and into cars. It's a very efficient method and is used quite a bit, particularly in South America, I believe. Now, I don't know of any place it's used in the United States.

But it is still used in the world somewhere?

Oh, yes. It's a good mining system; there's no doubt about it, but at that time it was dangerous. I don't think it's that dangerous now, because I think they watch it more carefully.

OK. But it was more dangerous then, because they didn't watch it carefully, or it was new?

It was probably more dangerous because regulations now would not allow anything like that dangerous situation to occur. In other words, if you were on the ball and kept up with the caving system all the time, there's nothing dangerous about it, but if you didn't, why, then it can be dangerous.

And so somebody wasn't keeping up on it when it collapsed behind you right there.

Yes. You can only do so much, you know. I'm not criticizing the management; I think the management was very good, but they can only do so much, and they catch up the areas that are the most important first.

Yes. And safety regulations have changed, is that right, over the years?

They have changed tremendously.

We may talk more about that as we go along. Let's go back to that summer then. So you became really aware of how dangerous underground mining was during that summer.

Yes. Very dangerous. Yes, I was very cognizant of this. [laughter] It was sometimes dangerous from a rather humorous standpoint. Remember, these trains were operated electrically, and you had trolley wire above, on the back, and if you were working in an area that is moving down—that is, the ground is giving slowly, the back

is coming down—why, when you're walking along there, your ear may be kind of close to that hot trolley wire, and it was at least 250 volts. It was a DC, direct current. I can recall many times a man would be walking along with an iron bar over his shoulders, and all of a sudden that would hit the trolley wire and give him quite a jolt! It was more humorous that way than anything else. [laughter] Humorous to those that were standing by, at least, but not to the person who got the jolt. I know of no instances where anybody was killed or even hurt that way, but I do know that almost everybody got shocked at some time or other. An electric shock of that nature is sort of a terrifying experience. You are really shocked.

Did you get a shock? Do you remember it?

Oh, yes, many times. I recall one time my ear hit the wire, and I momentarily passed out, but I caught myself just before I fell. [laughter] It was just a part of life, and no one paid much attention to it.

It was quite an experience for a young man. You would have only been about eighteen or so at that time, nineteen?

I was not quite eighteen. I'm a little hesitant to say, "Not quite eighteen." That's correct, but they had to stretch a point or two to allow me underground. I don't know what it is nowadays, but at that time you could not go underground if you were under eighteen, but my birthday was coming up, so they let me go.

And you were a high school graduate in college, so were you ahead of some other eighteen-year-olds, for example, in terms of education?

Yes. That's correct.

What else did you experience that summer at Ruth, Nevada? Any other impressions about mining?

Well, the most impressing thing I noticed was, if you're in a stormy area or a stormy season (and the Ely area is a stormy area), you go underground, and you don't know what it's going to be like when you come out. You might be surprised in snow flurries or something like that. It's always such a surprise when you come out into the daylight to see what's going on.

Because you're so isolated while you're under there?

Absolutely. You're underground; you're working under electric and your carbide lights. At that time carbide lights were all we used, besides the electric lights that were hooked to the regular electric system when you're underground.

So you didn't experience normal daylight; you didn't have temperatures from the outside.

You have no idea what the temperature is. The temperature is always the same underground. Of course, in one way, that's the nice thing about working underground, particularly in the winter—it's always warm underground. [laughter]

Yes. And you can't hear if there's thunder storms or any of the sounds of weather.

You're completely isolated from the outside.

It's a whole different world underground.

That's right. And, of course, that was my first time working underground, so it really impressed me.

Was that experience part of your deciding to go into that particular career?

It was *because* of that experience, as well as the friends that I developed about that time, that I decided that I would go into mining. It was very interesting to me. I recall distinctly that I was so interested in the mining method we were using and how it was all done, that I wrote several letters to a friend of mine here in Reno, with the idea that there would be some sort of chronicle of what I had been doing. Instead of a diary, it was in the form of letters to my friend.

And you wrote down that whole caving process?

Yes. Yes.

Do you have those letters now?

Unfortunately, I do not. I never retrieved those.

But it really made an impression?

Oh, it did.

When you talk about the friends that you made, were they friends that you made while you were mining, or friends that you were talking about from the university? You said that had an influence.

Well, they were friends from the university, I guess, that were also in mining. They were there at that mine at that time. One example is Paul Gemmill, who was executive secretary of the Nevada Mining Association for many years. I met him, and I recall distinctly, on a Fourth of July vacation that we had, there were three or four of us who decided to go up to the Lehman Caves area, which was close to Ely. We slept out overnight there, and I recall Paul

Gemmill—all of us in the firelight of a bonfire—reciting “The Cremation of Dan Magee.” [laughter] That was so interesting to me. It had nothing to do with mining, of course, but that was interesting!

[laughter] But that was the entertainment for the evening? Is that something he made up?

Oh, no, it’s Robert Service’s poem on the cremation of Dan Magee. I think that’s right. I think I may have the name a little wrong. [Note: The actual title is “The Cremation of Sam McGee.”] Oddly enough, that same trip, why, we went up to the Lehman Caves. The Lehman Caves at that time were known to exist, of course, and they’d been looked at quite a bit. That was just before the park service officially took them over, and a ranger with the park service there took us through the Lehman Caves and explained that they were not open; they were not even officially part of the park service yet, but he was there, and he might as well show us around, give him a little experience in explaining the caves to others. So we were very fortunate to have that.

When that summer was over, did you come back and change your course of study based on that experience, or were you already on the right track?

You’re already on the right track automatically, because the first two years of college engineering are the same. They’re basic courses, so there were no changes to be made until you start your junior year.

Was that different—mining engineering? Was that different than civil engineering, which is how you started?

Oh, yes. Of course, when you get into your junior year, you start taking some min-

ing and metallurgy courses, which, of course, you would not do in civil engineering.

What were some of the courses that the university offered for mining engineers at that point?

Well, Jay Carpenter had courses on what he called mining engineering, in which we took notes in his lectures on various mining methods and the costs of mining. There were metallurgy courses, which started out with lectures on various types of metallurgy; ended up with the laboratory courses in engineering. At that time, why, assaying and surveying were a definite part of mining engineering. Of course, the surveying would also be part of civil engineering. Now they don't seem to be stressed very much, particularly assaying, but those are some of the courses junior and senior year.

Is what's offered now changed from when you took the courses?

The assaying has been dropped. No, many of the courses are much the same, except there's a little more specialization now. Metallurgists are metallurgists. At that time a mining engineer's courses were about equally divided between mining, metallurgy, and geology. Fact is, I took more geology courses in my first four years than the average geologist does now. It just sort of turned out that way.

And that shows how much it's become more specialized? You had a broader range of courses, so that you could go into any of those areas, or you could know a little bit about all of those areas?

I should clarify that a little bit. See, I took more geology, actually, than a geologist would have taken at that time his first four years. It was by choice, as well as the

curriculum, but you had a lot of electives, and my objective was to spread it pretty well evenly between mining, metallurgy, and geology.

Were you learning about new technologies as you went through these courses? Were mining, metallurgy, milling—any of those processes—changing at the time you were going through school?

Not much. They were not changing very much. However, keep in mind that flotation was relatively new at that time. It came into being in the very late 1920s or early 1930s, and so that technical change was important in the metallurgical end of my university career.

So the flotation process of milling was being taught.

That's right. Oh, very definitely, stressed very heavily, but they also stressed the older methods, which might be very applicable, such as amalgamation and gravity concentration.

Anything else that was new that was being taught? This doesn't sound like it was a time for big changes in the mining industry then.

No, it was not. Nowadays there are a lot of relatively new ideas coming in. Of course, cyanidation was being used. That was also being stressed, you know. Cyanidation is a very old method. That goes back to about 1910.

While you were finishing your schooling, did you continue to work in the summers in the mining industry?

Very definitely. My first summer, of course, was the freshman year, which I mentioned at Ely. After my sophomore year, I

ended up having a job with a small gold-mining company near Bishop, and that's where I met Gerry Hartley. I knew him beforehand, but I didn't know him very well. School was out, and he was getting ready to go back to this mine out of Bishop, and I was going to go out to work for a quicksilver mine—B & B Quick, actually, on Montgomery Pass on the way to Bishop, so I said, "Well, you might as well come with me," and then I took him directly to the mine. His dad, who was the operator, was there, and one thing led to another, and I ended up working there instead of going to the B & B Quick. So, unfortunately, I have never been to the B & B Quick. [laughter]

What kind of work did you do that summer after your sophomore year?

Well, we were sinking a shaft there, and I was one of the people taking care of the compressors and other equipment on the surface, so that the pumps could keep going and the men could continue working in the shaft. It was a very small operation, and it had its many difficulties, but, of course, those difficulties meant I learned more about what could or could not be done.

The pumping, of course, was the biggest problem. The suction line on the big Cameron pump continually moved, and here was the problem: this would rub on the timbers, and, therefore, the suction line would wear a hole in itself. Of course, that would stop the operation. We finally ended up wrapping the suction line with rope. I remember so distinctly going to town (and by the way, I also drove the truck to get supplies) to get a half-ton of dynamite and 150 feet of rope. Well, I had put the dynamite on, and I wanted to tie it down. So how does one tie the dynamite down with 150 feet of rope you just got without cutting it? You just got too much. Well, anyway, I did it, and I learned a few things about handling rope,

and, of course, how to handle the rope without the necessity of cutting it into small pieces. [laughter]

Anyway, here I was; I brought back to camp a half ton of dynamite, other supplies, as well as 150 feet of rope to wrap the suction of the Cameron pump. The Cameron pump is operated by compressed air, and, of course, we had the problem of always keeping the compressors going, and they were not very good. They were not modern compressors by any means. They were off-breeds. We had plenty of problems with them. Our power was with single-cylinder engines. Hoisting was done by a four-cylinder Novo hoist, which is the only more-modern piece of equipment that we had there, but we worked it out.

Can I ask, when you decided to wrap the suction pipe with rope, how did you arrive at that solution? Was it something that somebody else had already tried, or was it something that you all came up with together? Do you recall?

You had to protect it with something, and rope would be a very good protector. It would last through more rubbing. So it was just sort of a logical step. I don't know if anybody ever did it before or not. Didn't make any difference, because it was just logical. [laughter]

Just logical, but that's the kind of thing that you had to come up with to make this project work and to keep the equipment operating and so on, and you thought that was a good learning process for you to see?

Yes, it was a pretty good learning process. [laughter] This was a 300-foot shaft. We were sinking it to the 400-foot level and branching out from there. We were going to, anyway. We did run into a little bit of ore at the 400, however, not enough to make much

difference. That was hoisted to the surface and was sort of kept by itself, and I understand later someone put up a small mill and milled that ore. I kind of wonder if they ever made anything out of it.

There were several little innovations we used, such as developing a water system for the change house. Having several miners around, you have to put up a change house, for changing clothes, showers, and so forth. When you come up from underground, you've got to have a hot shower. For one thing, a man coming out of the shaft, as soon as he hits the outside air, he's cold. He's comfortable underground where it's warm, but when he gets out, the cold blast of air hit him pretty bad. So we devised various methods for our water system there by burying a couple of large oil drums. These were not fifty-five-gallon drums; they were much larger than that. Anyway, little things like that were done. We had to haul water in.

So that was the summer between your sophomore and junior year?

No, it was the summer after my sophomore year, because I stayed there beyond the beginning of the year, and I did not go back to school. I had a job there, and I thought I'd stay and earn enough money so that I'd have something to go back on when I did go back. Well, that job played out though, and I went on to other work.

So you took a little break in schooling between sophomore and junior year?

Yes, that was only one year. Then, after my junior year, I stayed out again, and that break was, I believe, for five and a half years.

Was it economics? Was it financial necessity?

Yes, strictly economics.

Did it have to do with the Depression years, because it was hard to get the money to go school.

Oh, yes. After all, you know, I was earning five dollars a day on most of these jobs. Yes, my first job out of school when I graduated, I was getting six dollars a shift. [laughter]

Not a big increase, was it, for all that education? [laughter] So during this year off, what else did you do besides that job with your friend Gerry?

Well, I went to northern California, and I had a job with a placering operation, a company that was in the process of rehabilitating an old hydraulic mine, and I worked at that for several months; I don't know just how long. Then I came back to school and finished my junior year in 1931-1932. After that I was out of school for quite a while. About a year or year and a half working for the Nevada State Highway Department on their planning survey division wherein I had the opportunity to go around much of the state making rough Brunton odometer surveys of all the tertiary roads and trails in the state.

That really gave me a good chance to get acquainted with Nevada. I really appreciated that job, because I spent quite a bit of that time in southern Nevada and then after that went into northern Nevada. Remember, this was before the days of the four-wheel drive, let's say, before four-wheel drives were common. One must remember that later there were four-wheel drives in World War II called FWDs, as I remember. Anyway, I worked for them for at least a year and a half, and it was during that time that there were many small jobs that I worked on, very many, and they were short duration. At that time you were very lucky to get a job, and you grabbed it.

Jobs were hard to find during the Depression?

Yes, that's right. That was the latter part of the Depression.

Did you get any more mining experience during that time that you were away?

Oh, at the hydraulic mine, I learned a little bit there.

After the highway department?

No. There was no mining experience there whatsoever, except as to where some of the mines and old camps were. That's all.

So that five-year break was really about surviving the Depression.

Oh, that's all.

Yes. Then, when you could go back to school, what year was that?

Well, let's go back to the highway department. I had certain vacation time coming from the highway department, and I got a job using that vacation time surveying some mining claims at a mercury mine about sixty miles or so northwest of Winnemucca, and that gave me enough money so that when next semester of school started, which was January of 1938, I went back to school.

By the way, during the latter part of my highway department experience, I was married. Between the \$265 that I saved up from the survey job and my wife working, I was able to go back to school for the year of 1938. I finished in December of 1938, and that summer of 1938 I worked on various jobs, and part of it was surveying with the Soil Conservation Service out of Yerington.

I might add that during that five-and-a-half-year period that I mentioned previously,

that was the time when we had the PWA. There, one project was laying out some triangulation survey grids in the state of Nevada, and I got involved with that, and, in fact, oddly enough, my surveying experience that I picked up helped me a great deal getting jobs here and there. Then from that PWA job, we went to the Leviathan sulfur mine, about thirty miles due south of Gardnerville, and I worked there for several months.

So you graduated in 1938. You had a wife. Did you have children yet?

No children. Thank goodness my wife helped me get back to school. She helped me a lot, all the time, going to school.

Or it might not have been possible?

Yes, it would have been very difficult. She spent most of her time working in a jewelry store, a clerk, bookkeeping, and stuff like that.

What happened when you were a senior?

When I graduated, I went directly to the Cord Mill at Silver Peak. Well, in December of 1938, before the school year was over, why, S. Power Warren came to campus to talk to us at what we called the Crucible Club at that time—a club of mining engineers, so to speak. I knew that he was starting this mill there, so I talked to him about a job, being as how I had had milling experience previously, and he said, "Sure, that's fine."

S. Power Warren was a fairly well-known metallurgist from Denver and had a pretty fair reputation. He possibly did some teaching at the Colorado School of Mines.

And he also had ties with the Cord Mill in Silver Peak?

He was the designer, and I guess you'd say the mill superintendent. He was certainly looking for people that had had cyaniding experience.

Now, let's backtrack just a minute. Where did you get your cyaniding experience? I'm not sure I picked that up.

The reason you didn't pick it up is because I forgot to mention it.

OK. [laughter] Let's go back and get that.

Yes, well, we'll go back a little bit farther than that. In the summer of 1933, I was doing whatever I could, wherever I could, and I was working on a truck, and due to an accident, I had a very serious gash on my left eye. That was September of 1933, and then for a couple of months I was under medical care and could do nothing. About February of 1934, another one of these short jobs came along, and several of us that had known each other in school got a job about forty-five miles east of Tonopah sampling a silver mine up there—the Longstreet Mine.

Named after Jack Longstreet, famous Nevada frontiersman?

That's right. That helped out a little bit financially, and then, right after that, I got a job at the Silverado Mill south of Wellington near the state line, and that's where I got my cyaniding experience.

Was that your first experience in a mill rather than in the mining process?

That was my first milling experience out there, yes.

And was that quite a bit different from anything else that you had experienced—the cyanidation process?

I had no experience in cyaniding before that. Fact is, I know very little about any other type of milling. I've had no experience in other types of milling.

So that gave you the experience to get the job after you graduated then? And you worked just several months in that mill outside of Wellington?

It was after the Longstreet Mine sampling job that three of us that had known each other in school (and we also happened to work on the sampling job) all got work at the Leviathan sulfur mine in the spring of 1934, and we worked there for several months. I believe the mine shut down for a while or shut down entirely, I guess, and that was the reason we finally left. Leviathan is about thirty miles south of Gardnerville, west of Highway 395. I think it was after that that I went to the Silverado Mine south of Wellington.

Will you compare the two? Did you like the milling experience compared to your mining experience? Did you have a preference at that point?

I don't think so. It just so happened that that's what was available.

All right. Let's talk about Silver Peak. You got the job, went there after you graduated. Did you go there alone? Were you hired to go there alone, or did Mr. Warren hire more than just one person in that class?

Oh, he hired others, I believe. He hired Gerry Hartley for one thing. I think he and I went there together, because Gerry wouldn't have had any trouble at all getting a job with them, because Gerry had lots of milling experience, a lot more than I did. We roomed together. They had some tent houses set up. The road there by the mill is right on a ridge, and tent houses were on the north side of

this more or less east-west ridge, and they were very simple and very common in those days. They had a wood foundation and wood floor.

And how many men to a tent?

Two or one. Gerry and I roomed together, and we worked together. We must have had our meals at a boardinghouse right there. There was some kind of a facility right there, and I can't recall right now what it was, but I know we didn't have to go any distance at all. It was all in walking distance. It was not up at the mine, because I have never actually been at the Silver Peak mine itself, the Mary Mine.

What was your first job there at the E.L. Cord Mill?

The first job I had, which is actually the only job I had, was what they referred to at that time as "solution man." I took care of the cyanidation process. I had nothing to do with the actual milling. By milling, I mean the grinding of the ore. That was usually the way that was handled in those days. One man in a mill would handle the grinding part and possibly the flotation with it, and another man would handle all that was involved in cyanidation.

Tell me, how many men did it take to run this mill per shift?

Two men. Three shifts ran the mill. The operation would be going continuously, seven days a week. Ordinarily the shifts were 7:00 a.m. to 3:00 p.m., 3:00 p.m. to 11:00 p.m., 11:00 p.m. to 7:00 a.m. We rotated shifts every two weeks.

So how many total men were there in the area where you lived who worked just the mill, would you say?

You have to keep in mind, there are two men in direct contact to the operation. Sometimes there would be another man on that shift from whatever, and also, there is a mill foreman that is around all during day shift and possibly into the afternoon shift, as well. In so far as the housing in that area, why, as I recall, there were a few men living near the mill that were also involved with the mine. There was an accountant there that I believe lived in that particular area, and there was another engineer; I forget what he was doing. There were a few more than the number to actually run the mill. To say that it takes about ten to fifteen men, or something like that, would be about right to operate that mill continuously. A small, small number.

And so your job was the cyanidation process. Could you describe to me what you would do during a shift for that job?

You would make sure that your cyanide solution was at the proper level in the tanks and that the sands in the tanks were properly being discharged from one and going into the other, and there was quite a bit of checking of the valves there to make sure that the solution was going to the proper place in the proper quantity. I recall that all the pumps (they were very good, small centrifugal pumps) were on the lower level, and you're talking about something that's about like a three-story building, and so it took young men, rather agile, to operate this, because they'd be running from the top to the bottom quite frequently. It's quite a little moving back and forth.

Was it possible to take any breaks during that time, or when you were on the shift were you working the whole time watching all of this?

You're on the whole time. You don't consider breaks in this business, because

actually if everything's going right, that's your break. You really don't have to do anything—just stand there and watch things. That's all.

Just monitor. What if things aren't going right? What can go wrong, and what does it involve?

If things are not going right, why, you might have too much solution in one particular place. You might have some sand spills. Then you'd be moving rather fast. Turn off pumps, turn on pumps, and regulate them. These pumps are, as I mentioned, small, centrifugal pumps and very good, because you could turn the valves off against the centrifugal pump; that makes no difference whatsoever. Or you can turn the valve half on, and you can control it very well.

Was this all new equipment, could you tell?

Yes, it was. Well, practically all of it was brand-new. I'm sure that the grinding unit came from some other place. We had a large, what we called a "rake bowl classifier." That came from Weepah. As is very common in the mineral industry, sometimes you have to cut things in half and put them back together again, and that's just what they did to this classifier: they had to cut it with a torch, cut it more or less in half, and then weld it back together again at the mill.

In order to move it?

Yes, you cut it to move it, and then you weld it back after all the pieces are in the proper place. I recall hearing recently about a Caterpillar tractor being cut up that way and



"You're talking about something that's about like a three-story building, and so it took young men, rather agile, to operate this, because they'd be running from the top to the bottom quite frequently."
The E. L. Cord Mill at Silver Peak.

put back together again underground in a stope.

So that's a practice that's still going on in order to make things mobile.

Not very frequently with a tractor, but, yes, anyway, it is done frequently.

Do you want to kind of talk us through the entire process of the E.L. Cord Mill? Now, when you were there, it was called the Prescott Lease Mill. Is that correct?

Yes, it was. The operation was called the Prescott Lease, although the mill itself was commonly referred to as the Cord Mill. Why, I don't know.

What does that mean, the Prescott Lease? Was somebody leasing the mill from Cord, or how does that work?

I have an idea that the operation was a lease from the owners of the property, and, therefore, it was called the Prescott Lease, and Prescott in this case was the name of a man and had no connection with Prescott, Arizona. The Prescott Lease, of course, would be including the mine as well as the mill. Don't let me give you the impression that the mill was actually a lease. The mill was not a lease, but the mine would be a lease, and, therefore, the mill was built for the Prescott Lease.

Would you talk us through that milling process? We've got a flow sheet here.

Yes. This flow sheet is excellent. It's rather brief, but it gives me a pretty good idea as to what I actually did. Of course, the ore goes through the mill, the grinding unit, and from there it went through the flotation process. The flotation process is where certain oils are added to the pulp, and the pulp is then run through rectangular tanks, and

by the addition of air at the bottom, causing quite a few bubbles, why, the mineral which you are trying to float adheres to the bubbles, comes to the top, and floats over the side of the tank, and it's collected. Of course, this is a rather involved process requiring rather special attention to the feeding of these special oils, and then the concentrate itself here went through the cyanide process.

After the bubbles took the mineral, the froth (concentrate) went through the cyanide process?

Yes, that's correct, and this cyanide process was entirely separate from the sand leaching that went on just below that.

The cyanide process had been in use now for twenty years, almost thirty years, so was this the usual method, or was this something new?

No. The cyanidation of concentrates was rather new, because they sometimes are difficult to cyanide. In this particular case, though, it worked. Keep in mind that the part of the crushed ore that went through the flotation process was the fines or the slimes, but the sands went directly to the lower part of the mill, which was the sand-leaching part. There were six tanks there, and the sands first went to the upper three tanks and through a distribution system, which is rather unique and very old, though. The sands were distributed evenly in the tanks and leached there by the addition of cyanide solution, which was drawn off the bottom. Then after a certain length of time, being two or three days, why, the cyanide solution would be drained out of that tank; the sands would be sluiced from that tank to a lower set of tanks. By doing this, the sands are aerated—they are put in a different position in the tanks to get away from the possibility of channeling in the sands. It

was a unique method of sand leaching. I had never heard of it before, and I don't know that it's been used very much, but apparently it was an idea that S. Power Warren came up with, and I think it was a good idea.

And the result of that was a more even distribution of the cyanide?

Well, it gives you a better distribution. The cyanide is distributed evenly in one tank, but then there's always a possibility of channeling, and by moving the sand again to another tank, you get away from this. You put the sand grains in a different position than they were before.

Which distributes them more evenly? Plus, did you say something about adding oxygen which helps?

Yes. It adds oxygen, which is necessary for the cyanide process, and that helped a great deal. There was one peculiar thing about that system, though. Because of this continual sluicing of sands from one tank to another, you put a lot of cyanide into the atmosphere, and we always noticed that when we were working there. That quantity is not poisonous, but it was a little bit objectionable.

Odor? Is there an odor?

Yes, it's a slight odor.

But it didn't have any impact on your health that you could tell?

Oh, no. No, it was really not a health hazard. That part there was not a health hazard whatsoever. No. It's not hydrocyanic acid which kills people. We noticed that there was a humid atmosphere with a lot of cyanide, actually, that you're breathing the solution, but you're not breathing enough of it to do you any harm that we could tell.

You felt the same; you didn't have any ill effects? It just didn't smell good.

Yes. It's just an example that the human body was actually taking in cyanide solution but not enough to do any harm.

Were there any safety measures that you had to follow? For example, did you have to wear any kind of a face mask to protect you from that?

No, that would be impossible, because you'd be wearing this continuously, all the time and under great physical exertion, and it wouldn't be practical, and it really wasn't necessary at all. No, there was no problem there with that.

This kind of takes us into a little side trip here, but were there other safety measures that you did have to follow while working on that? Hard hat or steel-toed shoes, any of those things?

No. At that time hard hats were, as I recall, not necessary in the mill. In those days, though, hard hats were definitely necessary underground. However, there is so little that can go wrong that there is no safety measure that I can think of, except for ventilation. You had to keep in mind that you needed good ventilation in a place like that.

And was this particular mill set up with good ventilation?

Yes, it was. It was. But, in going a little bit farther in the process, I'll explain to you where there is a hazard, and it did cause some trouble there. The cyanide solutions, what we call the pregnant solutions that carry the gold, go through a precipitation process. It's a bag precipitator, wherein zinc is combined with the cyanide solution; then the gold replaces the zinc and forms a black

sludge that contains the gold values. This black sludge or precipitate is then dried and put through a furnace to melt down the bullion. At this particular mill, to dry the sludge or to dry the precipitate, they used drying pans, wherein the precipitate was put in rather large, flat pans with heat underneath the pans to heat the precipitates and drive out the water or cyanide solution—evaporate the water.

Now, what's dangerous here is that you're dealing with zinc precipitates, and when you heat zinc, you put off zinc fumes, which are poisonous to the body. At one particular time, why, there was something wrong with the ventilation, or they got too much heat under the zinc precipitates. Anyway, the fumes were extreme in the mill, and everybody in the mill became sick. I think it was a combination of diarrhea and vomiting, yes, and it just so happened that I was lucky—that happened when I was off on a long break, and I was out of the mill. When I came back, I heard about it, and it was unfortunate that everybody was sick. The company took very good care of everybody and brought in medical help immediately; it was just a matter of taking proper medicines to counteract this, and it was taken care of rather rapidly, but it just gives you an example of what can happen if some little thing goes wrong.

Did they have to shut down during that time when everybody got sick?

No, I don't believe they did.

They just got some ventilation in there, kept it going.

Yes, increased the ventilation, yes. Those that could, kept working; that's all.

And when you said they brought in medical help, do you know, was it a company

doctor, or did they bring in a doctor or just medicine? Do you recall?

No, they brought in help. They consulted medical people to find out what could be done. After all, Silver Peak's quite a ways from any real medical help in Tonopah. It would have been the closest in Tonopah. Not at all times did you have good medical help in Tonopah. Tonopah very frequently has problems having a doctor there.

So that was, to your knowledge, the only danger that ever arose at the mill while you were there—lack of ventilation?

That's all. Yes.

Is there more that you want to say about the process? You've described this method of moving from one cyanidation tank to another. That was unusual; you had not seen that before.

That was new to me, to transfer sands from one tank to another.

The rest of the process was similar . . .

Yes, very. Except that large-scale sand leaching, as this one was, was not done commonly in those days. Sand leaching is an old, old cyanide process that had been used for many years and was very common in the very early part of the century, but it was not common in the 1930s and 1940s.

So this was one of the few mills that had that process?

That's correct, yes.

Were you aware of any others? Do you know how many existed about that time?

No, I don't, no. Ordinarily, in the cyanide process, the ore is ground to a finer

state, and then goes through, what we call, "a counter current decantation cyanide process," where everything is in pulp form. There are no sands. You're not handling anything in sand. Everything is ground finer or is handled in pulp form.

Why was it that the process with sand leaching worked here? Was there something about the ore that was coming out of that area, or it just happened to be the particular technology?

I believe that S. Power Warren made many tests on the ore, and he must have decided that he could get the values out of the ore without grinding it so fine. Therefore, he saved quite a bit of money grinding, and it worked just as well.

I see. So then with that combination, it was a financial savings to the company to put those particular processes together, where in other areas, they might not have been able to get the value out of the ore without grinding it.

That's correct. Yes. Apparently, the ore was such that the values were in the cleavages, you might say, so that very little grinding would release the ore. Just as today we're doing a lot of heap leaching, wherein, if the ore is merely crushed, the cyanide solutions can permeate the cracks in the rock and thereby remove the values. Much the same general idea, but here we used the sand-leaching system.

A great deal of testing is done before a mill is built, and the nature of the ore, the nature of the way the mineralization occurs in the rock, will determine the metallurgical process you use to get the gold out of the rock. Of course, nowadays we do a tremendous amount of research that way, and because of this, we came up with the heap-leaching process, whereby we could get

practically all the values out without any fine crushing at all.

Which is why we no longer see the mills like they were built before. You have the leaching pads instead, because you don't require as much crushing.

Yes. That's right. You don't require quite as much crushing. However, in other places you may and therefore use the same, more common system.

Even so, you'd never seen that transfer from one cyanide tank to another. You haven't seen it since?

I have never seen it before or after, and I just wish I knew a little bit more about what the actual results were, but I have no idea.

But you do know that that was different from anything at that time.

It was absolutely different. Yes, the transfer idea was different.

And as far as you knew at the time that the Prescott Lease mill was operating, were there other cyanidation mills operating in Nevada? Were you aware of others in Nevada?

Oh, yes. The cyanide process was all over the state. Fact is, there were two other mills right in Silver Peak using the cyanide process. There was a mill west of Silver Peak; the Sunshine Mine was operating there. I don't know anything about that mill. It was probably there before the Cord Mill, but these other two smaller cyanide mills in Silver Peak were there long before the Cord Mill. They may be there now. [laughter]

In fact, parts of one are still there within Cyprus Foote Mineral lithium plant. It's all

in that area now, so you can see some remains of where that mill was, but there are some timbers and things that still exist that became part of this whole different lithium processing. Those cyanide mills in Silver Peak are gone.

One was the Chiatovich.

That was the first one, correct, in Nevada?

I don't know. But I don't really know when the lithium mill was put in.

That came in the 1960s.

That's when I was gone; I was not in the state then.

Let's go back to your time then at the mill. So you were working seven days a week?

Yes, seven days a week, eight-hour shifts, and you had some time off, of course. If you were on afternoon shift, as an example, you'd have practically most of the day to yourself. Gerry and I would go out and look around the area somewhat. We were very much interested in visiting the crater which appears in practically all the pictures of that area. When Gerry Hartley was a very young man his father operated a lead-silver mine—I believe it was called the Harmel or Hammel—not too far out of Silver Peak. We went over there to visit that little property, and, oddly enough, a picture of the operation of that little mine was passed out by the Central Nevada Historical Society just recently. The picture was probably taken during the operation. We were there much after the operation, probably in the 1920s.

We also visited the Sunshine Mine and went underground there to see what they were doing. All I remember about it is that they were using a shrink-stope system, which is very common, but the young man that was mining engineer there had got his

training at Boston, one of the big schools in the East, and he wanted to show us this unique system. We were surprised to find that it was nothing but common, old, shrink system, which was used all over the state of Nevada. He was a graduate of MIT, which is a very astute engineering school, but if you want to learn mining, you better go to one of the Western schools. [laughter]

Why is that?

Well, because you're right in the vicinity of mining. You're in the area, and you're more apt to get people that really know something about mining. The shrink system is very simple. It's where you're working in the stope; you blast the ore down, and the bottom of the stope is attached to a metal chute where you draw the ore out. You draw up just the right amount of ore so that the men can still work in the stope, and they're working *on* the ore; they're standing on the ore with their equipment to drill the ore above them. When they blast, why, then more ore is drawn out to give enough space for men to get back in there again and do more drilling and blasting.

It surprised us, both Gerry and I, that here this young man mentioned this strange system that they were using, and it was what we had used for years and are still using in small mines. [laughter]

What other exploration did you do in your free time around that area?

Oh, that's about it. When we had a small amount of free time, like during the day, that was ideal. That's about all we did. However, I must mention that I had an uncle who was a miner, and he happened to be at Silver Peak at that particular time, and so I visited him. I guess he was quite a character around the country. He came over here from Austria about the turn of the century, and he'd been mining at Western camps all over—a

typical ten-day miner, you might say. A ten-day miner is one where he stays on a job for a short period of time, and then after a week or two or something like that, he decides that he has a little money in his jeans, he's going to quit and go elsewhere. So that is common; the term "ten-day miner" applies to these particular people. Well, I guess at that time, why, my Uncle Johnny toned down a little bit, and he'd been working there for quite a while. Anyway, it's odd that I visited him at that time, and that's the last time I saw him. It was about five or six years after that, I inquired in Silver Peak and found out that he had died of silicosis at Goldfield.

Did he have any signs of silicosis when you met with him?

He probably did. He had a cough, you know. He was an interesting guy. He was commonly referred to by his cohorts as "Moonshine Johnny." [laughter] I have no idea why. As far as I know, he didn't have anything to do with making moonshine, but anyway they referred to him as "Moonshine Johnny." He was a kind of a humorous character, and I found out from someone at Silver Peak several years after that, that his last days, why, he was in the Goldfield hospital with miners dying of silicosis, and he kept the rest of them more or less amused by his stories and antics.

So he was a great storyteller and well liked by the miners. You said his name was Johnny? Was his last name Kral?

No, no. His name was Hausmann. He's my mother's brother. My mother and my uncle were born and raised in Vienna. My mother came over first to the United States but left a son in Vienna, and then her brother Johnny came later and brought the son, my half brother, Edward Brenkuss, the one who brought me to Reno.

And back to your Uncle Johnny, was that the only time that you'd ever seen him or met him?

No, I had seen him a few times before that. I very seldom saw him. He visited us in the Los Angeles area a few times. So that was one of the memorable things about that time in Silver Peak, was being able to visit with him.

When we were talking about how I happened to come to Reno, I didn't elaborate very much, and then it's rather interesting in what coincidences can happen. I'll go into that now, because it may be of interest to somebody. In about 1925 or 1926 I lost track of my brother and had no idea where he was, so I visited his old friends and people that he had worked with in the Los Angeles area. I remember the Cannonball Express was the name of the company. I asked if they had any idea where my brother was, and they said no, they didn't. They had not heard from him for many years. Well, somebody in that company was later traveling in northern California at the same time my brother, I found out later, was a traveling salesman selling candy in northern Nevada and northern California. Either this other party or my brother were stopped on the road with tire trouble, and the other party stopped, and in discussing themselves, why, they realized that they had connections. This man mentioned to my brother that I had been in the office asking about him, so my brother's wife wrote to my mother in the Los Angeles area. That's how I got the connection, and it was a short time after that, why, I hitch-hiked to Reno and came here to school.

It's interesting that you had an uncle who was in mining, and that's the life that you chose.

Absolute coincidence. No connection whatsoever. [laughter] It sure is, because as

was very common in the days of my youth in the mid-1920s, why, most young people that were engineering-inclined were always thinking of electrical engineering for some reason or other. I know I did, and then I knew I was going to go into some type of engineering. When I came to Nevada, it was due to my associations that I decided on civil engineering, and then, again, due to other associations, I have gone into mining. No connection whatsoever with my uncle.

I have one more question about your uncle. Do you know whether he came to the United States to do mining? Was he mining in Austria, or was that simply the work that was available to him once he got here?

I would say it was simply that the work was available to him. Oddly enough, most people, when you mention Austria, would say, "Well, he was probably a miner in Austria, because an awful lot of miners in the United States came from Austria," but my uncle came from Vienna, and coming from the city of Vienna or coming from the outlying areas of Austria are entirely different. For one thing, they don't even speak the same language. The Austrians in the outlying parts of Austria at that time were Slavic people, and when I first went underground and worked underground in the mines, I ran into these Austrians, and I thought they would speak German, the same as I used to speak at home, but, no, they were Slavic people. The mining was in the outlying parts of Austria.

So that was one of the groups. Were there other ethnic groups that you saw when you were out in the mining industry in Nevada?

Not in Nevada, necessarily, but later on, elsewhere in the Midwest, I ran into the people that came from Cornwall, which we commonly refer to as Cousin Jacks. Also the

Finlanders—Finnish people were involved in mining quite a bit in the Midwest. However, there are lots of Cornish people in Western mining. Fact is, they're very common in the Grass Valley area, along the Mother Lode.

Why are they called Cousin Jacks? Do you know where that came from? That's a term that's just used in general for people from Cornwall?

Yes, I have no idea. [laughter] The people of that culture and their interests and their ideas are very interesting, because they are the ones that came up with the imaginative idea of the little people that live in the mines and are commonly referred to as Tommyknockers.

That's a well-known story among miners, right? The little spirits that live in the mines.

Yes, that's right.

Yes. But you laugh when you say that. Is that something that you believed in or don't believe in?

Oh, no! [laughter] No, I don't believe in that at all, but it interests me tremendously. In a dinner meeting we had one time of the AIME [American Institute of Mining, Petroleum Engineers] one of my cohorts and his wife came up with a program where he was the Tommyknocker, and they put on a pretty good program. [laughter]

So it brings a lot of humor, if nothing else.

Yes, that's right. Yes.

I want to go back to your work at the mill and talk about some of the technical aspects of it a little bit more. Tell me, what was the source of the water supply in the Cord Mill?

Do you know where the water came from for that mill? It was pipelines that were already present?

I have no idea. A very good question, but water was no problem.

What about living conditions? Was water also available to you in your tents and so on, or did it go directly to the mill?

We must have had some shower facilities somewhere, and I have an idea we had our shower facilities in the mill, but there was water somewhere available to us; we did not have running water in the tents. I suppose they used outhouses there for the tents. If you wanted water in your tent, you carried it there, but I would think that the shower facilities were probably in the mill. I don't really recall that. There are a few gaps there in my memory.

What about transportation? You said everything was within walking distance while you were there. Did you have a vehicle there with you?

Oh, yes, I had my own vehicle there, a 1936 Pontiac. [laughter]

It could make it up that hill? That's a pretty steep hill.

Oh, yes, to the mill I didn't think was much of a hill.

Wasn't that bad. And what about the transportation that was used in the work, getting the ore from the mine to the mill? How was that done? Do you remember that? Am I asking you all the wrong questions? [laughter]

You've asked me the wrong question there, because this had been bothering me for a long time, ever since you first men-

tioned that property. I can't recall how the ore got to the mill, and this is something that I've got to talk to Gerry about. I mentioned it to a lady there where he lives that I've got to talk to him about something. I would like to come back to that, because this bothers me.

That's good that we have someone else that you can talk to about it, though. Maybe it'll start to come back when you two visit about it again.

Yes, very fortunate that I have somebody, because, you know, the people that I remember that worked there, they're all dead now. 1939 was quite a while ago.

Do you remember what the pay was to work in that mill?

Yes, six dollars a shift. Six dollars a day, and that was pretty fair wages, because I remember my sister-in-law, who was a registered nurse in 1939, I was talking to her about this. She said, "Well, that's pretty good. That's what I make."

So those were good-paying jobs in 1939. Did that pay include your room in the tent house?

Oh, yes.

Did you pay for your food separately?

I don't know.

Was your wife still living in Reno during that time?

Yes, my wife was in Reno, and on long breaks, why, I would come to Reno.

And was the money that you were earning part of what was contributed to the household here?

Oh, yes. That was our principal income, actually. She was working, but I was earning more than she was by far.

And the six dollars a day, that was more than what people were earning in the mines?

No, in the mine they would be earning about the same.

Was there other prospecting going on in the area, or was it pretty much focused on working the known mines?

No, there was no exploration going on in that area at that time, and the only other mining operation going on was the Sunshine. The Mary Mine and the Sunshine were the only operating mines. I don't know about the Chiatovich Mill, or if the mill was actually operating then.

Did you spend much time in Silver Peak itself?

No, there was no reason. After all, a place like that, unless you're a barfly, why, then there's no reason to go.



I want to start today just by asking you a couple of questions from the previous tapes. The first one is, could you explain "changing rooms" and the need for hot showers, both in the mines and the mills?

Well, in both cases, when a man got off shift or finished a shift he was somewhat dirty, and it was necessary for him to clean up, and in all cases the mine supplied shower facilities. Now at the Mary Mine itself there were shower facilities for the men working underground, and there were shower facilities in the mill for the men when they got off shift in the mill. Of course, they just took

their shower and didn't have to go very far to where they lived.

Was it entirely because they were dirty, or were there some health reasons beyond just being dirty from the work that they were doing?

Well, it was entirely for the fact that a man is filthy when he comes out from underground and when he's working in the mill. Sometimes he's working rather strenuously in a mill, if they have a spill, and he has to do a lot of shoveling or something like that. That's the reason that a man just has to have a shower after that work.

I was just wondering if there's any need for the shower because of the changes in temperature. You mentioned earlier that it's warm in the mines, and then they might come out, and it would be wintertime and cold. Would that be a health threat to them?

Yes, that's a good reason for a hot shower when you're working underground, because when you're underground the conditions are relatively warm, and in the wintertime, of course, it could be snowing outside. It's quite important for a man to have a hot shower and sort of rehabilitate himself before he goes out.

Get cleaned up and get his body temperature stabilized and so on. So those were typically provided in both the mines and the mills.

Oh, yes. Everywhere the company provides those.

And since you lived in tents, you didn't have showers in your room. So this was kind of a community shower area.

Yes. At the mill, the showers were in the mill. At the mine, they would have had what

they call a "change house," where you change from your grubby underground clothes to your street clothes and take a shower in between, of course.

Do they have lockers there or somewhere where people could leave their street clothes?

Usually, they have either lockers or some means of hanging up your clothes.

A second question that I have is that we've mentioned several systems that were used in milling, and we need to have a brief description about each of them. Could you go through and tell me about flotation, amalgamation, and gravity concentration?

Flotation became rather important in the late 1920s or early 1930s, and, actually, the original name is froth flotation, whereby certain chemicals and air are added to the pulp, and the air facilitates the formation of bubbles, and the chemicals, of course, promote the bubbles. Gold, silver, copper, or whatever minerals you're after adhere to the bubbles and rise to the surface, and then they have a means on the machine to scoop that froth off. That is then filtered and dried and shipped to the smelter.

Would the flotation system be used in conjunction with the cyanide system, or is it used separately?

Yes and no. The flotation system can be used separately or in conjunction. At the Cord Mill it was used in conjunction. There, the flotation concentrates, instead of being shipped, actually had their own cyanidation process whereby the cyanide solutions dissolved the gold and silver in the flotation concentrates and eventually went through a bag zinc precipitation system and then to smelting on the site.

So that was still fairly new technology, even in the 1930s when you were at Cord Mill then, the flotation?

Oh, yes. It hadn't been around very long after all, but it was a very common method. It was used almost everywhere. Well, just like so many new systems coming in, in the 1930s they thought the flotation was the answer to all our problems. Of course, it wasn't.

And you said it wasn't the answer to all the problems. Were there certain situations where it just didn't work?

Well, it may not float as well as the people thought it should. That was one of the problems.

What about amalgamation? Give me a definition of that.

Amalgamation is an extremely old system whereby the gold pulp or slurry is put in contact with mercury in one way or another, and the gold and silver—free gold and silver that is—adhere to the mercury and form what we call an amalgam. That amalgam is collected, either by gravity or on silver plates, and then it is put through a distillation process where the mercury is driven off leaving the sponge of gold and silver behind.

And was that used in conjunction with the cyanide process or not?

It could be used, yes. If you had free gold, it would be very logical and almost imperative that you used amalgamation to retrieve the free gold, because cyanidation does not work at all on coarse gold, because it's too slow a process.

Was the amalgamation a part of the Cord Mill, or was it not?

I believe amalgamation was used somewhere in the Cord Mill, but not extensively.

More was sent to the flotation system?

That's right. It might have been used as an amalgamation trap somewhere, but I know very little about amalgamation being used at the Cord Mill.

What about gravity concentration? Give me a definition of that.

Well, gravity concentration is used more when the desired mineral is concentrated, because it is heavier than the gangue mineral and, therefore, by panning or shaking tables or sluice boxes or something like that, why, the heavy minerals are retrieved.

So that's the idea behind panning for gold?

That's exactly the principle. Panning is a principle that's used in the concentration processes.

You also mentioned a piece of equipment at the Cord Mill, the rake bowl classifier. Could you tell me something about that? Was that an ordinary piece of equipment or was that unusual?

Well, it's the combination, you might say, of two different ideas. A rake classifier is whereby the coarse material, because it sinks to the bottom more readily, is gradually raked out of the bottom or the lower part of the classifier and goes back to the mill for regrinding. Well, combine that with a larger bowl, such as eight, ten, twelve feet in diameter at the lower end of this rake classifier whereby you have a lighter situation with your pulp, and the heavier, coarser

material sinks to the bottom. Eventually, the rakes pick that up and take it back to the mill.

A bowl classifier is something like a thickener, you might say, whereby there are rakes at the bottom that move very slowly, and as the heavy particles sink to the bottom, these rakes pull them into a central spot where a pump pumps the slurry to some other part of the mill. A bowl classifier is something like that.

It's a process for separating the two different sizes of material.

That's exactly what it adds up to. The principle is to remove the coarser particles that may require finer grinding and get them back to the grinding mill.

You were at the Cord Mill for about three or four months. Did you spend any time in Silver Peak, the town?

I went through Silver Peak on occasion, but to my knowledge I never actually stopped in Silver Peak except, at one time, I stopped at the outskirts of Silver Peak to visit an uncle (my only uncle by the way) who was living there and working at a nearby mine. To my knowledge, this is the last time I saw the man.

You told us a little bit about Uncle Johnny, and he was known as "Moonshine Johnny," and your visit with him, but could you describe where he lived?

To the best I recall, it was a small cabin on the outskirts. [laughter] I don't know, maybe a ten-by-sixteen cabin or something like that at the most, and he seemed to be very happy there.

Was it a wood cabin?

Oh, yes. It was not a tent house. It was actually a wood-frame cabin.

Was it something he rented, or did he own it?

Oh, I have no idea. He undoubtedly rented. There was no reason for him to own a cabin.

You called him a ten-day miner. He moved around?

That's correct. He moved around quite a bit. I will admit that this time in his life, why, he probably settled down a little bit, and he probably worked at that mine longer than he usually worked at mines.

He died in that area. Do you know if he's buried there in Silver Peak?

To the best of my knowledge, he must be buried in Goldfield, because he died at the hospital in Goldfield. See, Silver Peak would be in Esmeralda County, and, therefore, he went to the county hospital. As I understand, he went to a county hospital in Goldfield and died there.

Working at the Cord Mill seems to have left an impression on you. Can you tell me what it was about that experience in your career that was important to you?

[laughter] As best I recall, one thing that struck me is the first time I had experience with a large piece of equipment that was too large to be easily handled on the roads for transportation, being cut in half and then welded back together again as one piece. That was the rake bowl classifier. It came from the Weepah Mill. I don't know how long Weepah Mill was operating. The discovery of Weepah was made in 1927, and when it was shut down, I don't know.

You had heard of this before, of cutting equipment in two in order to move it. Is that correct? Or had you not even heard of it before?

I don't think I even heard of it before. Since then I've run into all kinds of things—large pieces of equipment being cut and rewelded together—but this was a new idea to me.

How large is this piece of equipment? If you had to describe it, is it as big as your house, or is it as big as this room?

Oh, no, it's about twenty to twenty-six feet long and as wide as about twelve feet.

And so, when they cut it in half, was it the length that they had to cut in order to move it?

It was rather long. Yes, they cut it in half crosswise. In other words, they cut the length in half.

And then moved it on two trucks?

Yes, apparently that's what they did. The fact is that it was a rather new idea to many people there. They thought it was a novel situation.

What else impressed you?

Well, of course, I was particularly impressed by S. Power Warren's idea of transferring sands from one tank to another and thereby increasing the possibility of good gold recovery. It was absolutely an innovation. I don't know of it being done before or after that. I was impressed by Mr. Warren's knowledge of the metallurgical industry.

Did you get to know him pretty well while you were there?

Oh, just fairly well, and following that experience I met him at a few meetings years later. Another thing I appreciated about the Cord Mill is their system of pumps. All the pumps were in the same place; it was very easy to get at them and very well designed, planned by S. Power Warren. He came up with the idea. Where he got it, I don't know.

Maybe one thing that bothered me is that the time I was there I never did get up to the mine. [laughter] The Mary Mine. It was only a few miles away, you know, but I never had an occasion to get there. I would have liked to have seen something about what they were doing there.

The other thing that impressed me in that area is that below the Cord Mill is an old volcano crater which shows up in all pictures that you have of that particular area. My partner and I climbed around there quite a bit. It was interesting to us to imagine just how the lava flowed out, and you could see, looking at the remains there, just what happened. One side of this crater gave way, and the lava flowed out over the flats.

When I was there, one of the people at the Mineral Ridge Resources told me that volcano still shows up as hot on the map from satellite mapping. It's fairly new in terms of earth age.

Oh, yes. That's right. It's relatively young. Yes, you go out there; it looks like it might have happened a couple of weeks ago or something. [laughter] It would show up in photographs very readily, because here you have a bland desert area, just absolutely flat, and right in the middle of it is this volcano. No mountains near it at all.

Let's talk about where you went from Silver Peak, especially some of your experiences in Nevada. You had a pretty long career in Nevada mining.

Well, first from Silver Peak I went to Northern California on a little gold project that we tried there for a few months, and from there (I guess, it was about 1939 or 1940) I got a job with the department of edu-



"The other thing that impressed me in that area is that below the Cord Mill is an old volcano crater which shows up in all pictures that you have of that particular area."

cation in Carson City teaching prospecting classes under what they called their vocational education department. I taught these classes for a few years, and they were stopped very suddenly by World War II. I remember so distinctly having taken some members of the class out to look at some mining properties and prospects on that December 7, 1941, and when we came back, the first person I dropped off, why, his wife came out and said, "The Japs have just . . . bombed Pearl Harbor." [pause]

That was an emotional thing for you.

Yes. Well, at the time I didn't think of it as being so emotional, but when I think back about it, why, it . . . it definitely was an emotional experience to many people. At that time, well, it was a terrific shock, of course, and you're wondering what's going to happen next. And then the extreme caution of not having your lights exposed at night and covering up all your windows with craft paper so that the light could not shine out. I remember so distinctly covering the windows in the building that I was using to teach the prospecting classes in Fallon at that time. Right after that, why, they needed mining engineers and geologists very badly to appraise mining claims—to determine what damage was being done to the claim holders, and that's when I was, more or less, "recruited" you might say, or ordered [laughter] to stand in line with them.

Were you in the military?

Oh, no. This was strictly civilian. It was under the war department.

And when you say, "what the damage was," tell me a little bit more about the job.

Well, the damage would be that for the prospectors, because we were talking about the claims on bombing and gunnery ranges.

The prospector could not go onto his claim to do any work. Therefore, there was some damages due to him.

So the government was essentially taking that land back?

Absolutely, taking it back temporarily at least, so many places where people thought they had some potential, they could not go in to determine that potential.

And what was your job specifically? What did you do?

Well, we would go onto these mining properties and list the improvements that had been made and, as best we could, evaluate what the mineral potential was for that property and write brief reports on this. That in turn was taken to the real estate people in the same group, and they would negotiate with the owner as to what damages were due.

So your assessment was, at least, part of the decision on what was due to the miners?

That's correct, yes.

So you went from teaching prospecting to working for the war department. What happened then? How long did that go on? Because the mines and the mills were being shut down. Mines all over Nevada.

Yes. L208 stopped all gold mining. L208—I don't know whether it was legislation or not; it might have been a presidential order, but through L208 most gold mines were shut down, because the labor and the materials were needed elsewhere.

So when you finished with that, working for the war department, what did you do next?

Well, I worked in a small mercury mine in northern California for a few months. About that time, my brother, who was living in Southern California, lost his wife, and I decided to go to the Los Angeles area to be with him for a while, and, of all things, I worked in the shipyards for a while. [laughter] It had something to do with the determination of how much in the way of munitions could be stored in certain compartments, and was it logical. Then I finally realized that I best get back to Nevada, and I was able to get a job with the U.S. Bureau of Mines drilling iron deposits and one fluorospar deposit in Nevada. After working for the U.S. Bureau for a few years, why, I had the yen again to go out on my own to try to see what I could do, and I prospected, you might say, and worked in tungsten. Actually, we found a little tungsten ore, and we milled at Bishop, California. Following that, why, the Nevada Bureau of Mines was interested in someone that had a little writing experience to work with them. My writing experience had come from my work with the U.S. Bureau of Mines where I wrote three different publications on my work with them. That was on iron ore as well as fluorospar.

Then, when I was with the Nevada Bureau of Mines, I first studied the mining districts of Nye County and wrote a bulletin on that. Following that the Nevada Bureau of Mines and the U.S. Geological Survey started a cooperative agreement to study the iron deposits in Nevada. I'd already had some experience with iron ore deposits, so I fit into that pretty well. The goal was to find out more about the potential of iron ore in Nevada and therefore help companies that might be interested in mining iron ore in Nevada. At that particular time, Nevada iron ore was particularly desirable for the open-hearth, iron-ore smelting system being used in the Midwest. It was therefore very logical that this project go forward. We first studied the ore deposits out of Lovelock, which

were very important, and at that time ore was being shipped to the Midwest for the smelters.

For what purpose? Why was there such a demand for iron ore at that point?

That particular iron ore we had in Nevada was a high grade magnetite ore that was right around 60 percent iron; it was heavy and therefore in the open-hearth system, it would sink readily in the melt and help oxidize impurities in the iron ore. The open hearth system is principally to make the blast furnace process into a pure iron.

And Nevada had high quality iron ore, which was very desirable.

Yes, helped that a great deal. Oddly enough, that system is not being used nowadays. Now they use an oxygen-lance system. They put the oxygen into this melt with oxygen lances instead of using the ore. It's an entirely different process now.

So Nevada's iron ore is not in demand like it was when you were working on it.

No, not for that purpose. [laughter] At the time this work was going on out of Lovelock, and some mining was done in iron ore. The iron ore, besides being shipped to the Midwest, was also being used as ballast in ships, and it was also being used as a uranium shield. I forget now just exactly how that was used, but the concrete made out of high grade iron ore makes an extremely good radioactive shield.

I see. So the beginning of nuclear energy created a demand for the iron ore, too.

That's correct. That's all I can recall about that particular part. The cooperative effort between the Nevada Bureau of Mines and the U.S. Geological Survey was started

in Lovelock, and we made an extensive geologic survey of that area and then went elsewhere in the state, and several small deposits that we worked on were continually worked for a long time after that for iron ore.

And did you go beyond Lovelock? You went around all of Nevada?

Oh, yes, we went into northern Nevada and an iron deposit near a Jungo, Nevada. It's on the Western Pacific Railroad, north of the Black Rock Desert. There were a couple of other places in the state—one out of Wabuska that was also being worked and the one right near Gabbs, Nevada. That's a rather small deposit but a very interesting one, because there's this one particular mineral referred to as "mountain leather," which is an outcome of the metamorphism of a ferro-magnesium mineral, and this mountain leather looks just exactly like a chunk of leather. That's the only place that I ever found the specimen myself. It occurs in many places, I presume, but I found it there, and I thought that made it very interesting to me.

That is amazing. So you were all over northern Nevada then with this iron ore project.

Yes, I got around northern Nevada quite a bit on that project.

And published three documents from that?

Yes, there are three different parts under one name. The first one was called, *Ore Deposits of Buena Vista Valley*, and the others are *Ore Deposits of Nevada*, parts one and two, or something.

What happened after the Nevada Bureau of Mines job? Where did you go from there?

Oh, because of my experience with iron ore in Nevada, I got acquainted with the Ford Motor Company people that came out here looking at these deposits. This man said that in a few months they might have an opening for a mining engineer geologist in the Upper Peninsula of Michigan, which is the Lake Superior country. Lo and behold, that developed, and I told him I was interested. I went into mining because I wanted to see various, far parts of the world, and I hadn't gone much farther than Nevada so far. [laughter] Well, I got to California with the war department. I got into New Mexico, too. Then, in January of 1955 the family and I moved to Iron Mountain, Michigan.

And how long were you there?

Almost fifteen years.

And what was your job there?

To look after Ford Motor Company's mineral lands in the Upper Peninsula. Old Henry Ford wanted to be self-sufficient in everything, including iron ore, and he also wanted to be self-sufficient in the hardwood that was being used in the station-wagon bodies at that particular time. Therefore, he bought up a lot of land in the Upper Peninsula for the hardwood as well as for the iron ore potential, and they actually mined iron ore there. My first job when I got to the Upper Peninsula of Michigan was to shut down and dismantle what was left of one of the iron-ore mines, because it was no longer profitable. Then I explored for iron ore in the Upper Peninsula. One thing lead to another, and I started looking for other things on their lands, too, but, although I found some good leads, the company was not particularly interested in prospecting. Almost the exact words that they told me. So, eventually, they decided to move my office to

Dearborn, Michigan, and having had six months experience in Dearborn previously, I decided that that was not for me, and they gave me the opportunity for early retirement, which I took immediately.

What didn't you like about Dearborn?

Too many people, and I don't necessarily like the way large corporations work.

I see. What about them? Can you say? If you had to name one thing, what would it be?

Well, the one thing that I noticed—there's too much of a competitive attitude among the employees instead of a cooperative attitude to get the job done, and that I could not stand.

Had you run into that in Nevada in your mining experience, or was Ford Motor Company the first time you saw that?

No, that was the first time I saw it. You will find that in many companies, no matter where you are, but in my mining experience I had not run into that. There was more of a cooperation to get the job done.

So workers and management, everybody was working together in Nevada?

Well, it appeared that way to me. Yes, we were all working pretty much in conjunction with each other. From there I worked with the Hanna Mining Company for about six or seven years. Three years of that were largely in southern Arizona, and three years were in the state of Maine, where we were trying to find nickel copper reserves on a deposit that had been known for over a hundred years there.

Finally, Hanna Mining Company didn't need my services and gave me the opportunity for an early retirement, which I took then. I had a friend in New Mexico who was a land surveyor, and being as how I had spent much of my career in land surveying, I worked with him for a while, but at the same time I was doing some work for the Arizona Department of Mineral Resources. I soon found that I couldn't be doing both, so when I finished the job with the Arizona Department of Mineral Resources, I decided I'd look into Nevada. I made one trip out here, and I found that I had not lost all my ties to Nevada by any means, and I came back to Nevada.

I want to go back just a little bit. You touched briefly on when you were teaching prospecting. Tell me a little bit about those classes and how that was set up.

Well, the classes were set up for three or four weeks at a time. When they were set up for three weeks, I would just teach mineralogy, more or less, and a little bit of geology and the study of rocks with the students. That's all it amounted to. But if it was set up for four weeks, well, then I also taught them the rudiments of fire assaying, and that was very interesting to me, because that was something I had done in the past; I had done quite a bit of fire assaying.

Describe that process.

Oh, fire assaying? It's where you take a known quantity of ground pulp and mix it with certain fluxes and smelt it in a crucible in a small furnace. And in this flux or mixture you have also put a lot of litharge, where you ended up with about a twenty-gram button of lead, and that lead would contain your gold and silver values. And that is put back in the furnace in what we call a cupel that

absorbs the lead but leaves the gold and silver bead behind. Then you weigh the bead, which is both gold and silver, and dissolve the silver out of it with nitric acid leaving gold which you weigh to determine the gold content. And being as how you started with a known quantity, by certain formulae, it's a very simple matter to determine how much gold you have per ton in that ore.

That's a process that's been around for centuries.

[laughter] It's been around—maybe not to Agricola, but it's been around for a long, long, time.

And it sounds like you took the students out into Nevada.

Yes. I liked the field trips very much, because there I could go right on the ground and look at somebody's prospect and explain things more easily than I could in the class. The students liked it, too.

They could really see what you were talking about with the different rock formations being together and so on.

Yes, yes. In the classroom I would have all kinds of mineral specimens to show them and rock specimens. I found that the students who were all adult persons in various vocations in life—carpenters and whatever—were very much interested in this, but I could teach them more out in the field than I could in the classroom.

Were these evening classes?

Yes, they were all evening classes.

About how many students would you have in each class?

Oh, you'd have maybe a dozen, and sometimes maybe forty or fifty students, you know. I taught these classes here at the university, too, for adults, and here we had quite a few students, actually.

But these were all people who were going to do mining as an avocation rather than a job?

As an avocation, strictly an avocation. It was not meant to train miners or not to train people that would have to understand a lot. If they were professional people in the mining industry, this was not for them at all.

Because it was very basic, just so somebody could get started.

Extremely basic, yes. It was to get people interested in prospecting. The idea is that, after all, if people get interested in prospecting and find something, it means a great deal to the economy of the U.S. as well as the state.

Because if they prospect and they happen on something that really has some value, then they would be able to establish a mine and sell it. Is that the process?

Oh, yes. And then the taxes would develop out of that to help both the U.S. government as well as the state, wherever they are, and the counties, of course.

So it was training more people to be involved in the business of mining but in their spare time.

Yes. Strictly an avocation.

Since you came back to Nevada from all over the United States—Michigan, New Mexico, and so on—have you worked for a

company, or have you been doing your own projects?

Oh, no. It's exclusively consulting work whereby I'd work on, maybe, evaluating prospects or getting some ideas, or it might be land-records work, something like that. Just whatever's necessary.

Do you do any work with the university still, or have you since you came back?

No. I have done no work here, no teaching at the university. I'm active in my professional organization, which is the Society of Mining, Metallurgical, and Exploration Engineers, and part of the American Institute of Mining, Petroleum Engineers.

They've changed the name. Is there a local chapter to that?

Yes, there is a local section here, of which I was secretary for a long time. Now they sort of call me secretary emeritus, and I help do quite a bit of work with that organization all the time. One of the outcomes of that group is to put out a historic mining calendar every year, which is a fundraiser for scholastic contributions that we make, and that takes a lot of my time.

Just putting together the calendar, finding the photographs, identifying, and so on.

Yes. You're almost to the bottom of our photographs, too. We've got to find a new source.

I think we've covered everything that I need for the Silver Peak history. I really appreciate your contribution to this.

I'm sure happy to help.



[Note: The first interviews with Victor Kral were conducted for the Silver Peak history project. Later, I returned to complete his oral history as part of the statewide mining oral history project.]

VICTORIA FORD: *Today is April 21, 1997. My name is Victoria Ford, and I am here with Victor Kral in his home in Sparks, Nevada. We're going to be talking about mining in Nevada, and we're going to start with the Mackay School of Mines. Vic, let's start with how you got into college.*

VICTOR KRAL: The principal of Reno High, whose name was Otis Vaughn, helped me a great deal to get started with school simply by going over my records very carefully and determining that I did have the necessary course work and grades to get into college. I don't know just who influenced me more to go to college. It might have been my associates. Other men or young people of my age probably influenced me to start college more than anything else. However, I guess I always thought that college was necessary for economics, as well as being a well-rounded citizen.

All right. And so you came to Reno to live with your brother, if I remember correctly, and were you living with him when you went up to the university?

Yes, I was. The fact is I lived with him during my senior year in high school, and then following that, I guess I got acquainted with a couple of brothers who were in civil engineering and that helped influence me to go to school. At that particular time I thought I would be more interested in civil engineering than anything else. You have to keep in mind that about that time in his-

tory every young person that was interested in engineering was, for some reason or other, interested in electrical engineering. At that particular time things were moving very rapidly in electrical engineering, but it didn't take me long; because of my associations, I became interested in civil engineering. I started at the university in 1928.

What was it about electrical engineering? What was happening in that field that was so exciting?

I think it goes back more to the early 1920s that electricity was becoming so important that I and most of my associates were particularly interested in electrical engineering. It's hard for me to say just why, but I remember reading articles about a very important electrical engineer at that time whose name was Steinmetz, who was always pictured with a cigar in his mouth. Anyway, one thing or another lead me into electrical engineering. I was fooling around with radio at that particular time, too—the simple crystal sets.

What are some of your first memories of the university campus and your classes?

Well, of course, the first two years on the campus are much the same no matter what, particularly in engineering. It's difficult for me to recall my freshman year. I took English from Paul Harwood. He was a professor of English. My math courses were from both Searcy and Haseman. Then, my sophomore year I started in physics and chemistry; I got along fairly well in those courses. Math was difficult. Chemistry was both difficult and interesting. The one thing that I recall about chemistry—I had a very good professor, Sears, who later was the head of the department and well-known on the campus. One of his peculiarities—he would give the students an unknown, and they would have to determine just what it was

and come back to him and try to explain what this unknown was. If they were wrong he'd kind of chuckle and laugh, and this really disturbed the students, because, after all, they had worked pretty hard on this material to have somebody laugh at them at the end. [laughter] It was not the right thing. There was another peculiarity about him. He was a good prof, but for some reason or another, when he set up his demonstration experiments they almost always flopped. [laughter] Something always seemed to go wrong. I can only say that he didn't do enough work ahead of time to make sure that they would work. I particularly felt sorry for the guy.

But it was entertaining at the same time. [laughter]

Oh, very entertaining. You could expect that it would fail. [laughter]

You started out thinking in terms of civil engineering. Where did that change for you?

I suppose it was after my freshman year in college. I had an opportunity to get a job at Ely at the Ruth Mine, and so I went out there and ended up underground. It was the first time I had ever worked underground. It was interesting to me, and that's when I became interested in mining. The mine at Ruth, the particular shaft that I was working in, was called the Star Pointer Shaft. It was underground for copper, and at that time the price of copper was pretty good. It was there that I got better acquainted with some of the students at the Mackay School of Mines who were also working there. I appreciated very much the fact that the management made it possible for us young people to get a pretty good, broad view of what was going on in the mine.

The mine was a caving operation, wherein, the ore is purposely broken and drawn from chutes so that it caves by itself.

It is ordinarily not necessary for any blasting to go on. The material is more or less soft. It's a very cheap method of underground mining—somewhat dangerous, because the ground is continually moving. I remember so distinctly that in many parts of the mine the timbers were coming in to the point where you had hardly room to move around. That required most of the work there to completely, continually replace these timbers. That is characteristic of the caving system.

I remember so well, moving back in a drift, and my ear touched the trolley wire and gave me quite a shock. This was common. Everybody that worked there occasionally got a shock. The voltage was 250 volts or more of direct current.

After working with a timberman for a while to get acquainted with what's going on in the mine, they took me, as well as other young people who were rather agile, and put us on the ore trains. I was working as what you might term a brakeman on the ore train. I would signal the motorman when to move the cars ahead and spot them so that the ore chutes could drop the ore properly into the car. The signals were given by taking about a one-foot piece of pick handle or a shovel handle and tapping it on the wire. This carried the sound very readily to the motorman. Therefore, we were referred to as the wiretappers. [laughter]

That later became a negative term in the 1970s—wiretappers.

[laughter] Yes. Accidents happened occasionally there. I don't think there were any mine accidents while I was there in 1929. The Ely area was in a boom period; life was cheap. I recall one of the men that I worked with there—a single man—his body was found at McGill on the grizzlies. In other words, he had been murdered and his body dumped over the side of a bridge going over the car tracks, and it fell into the cars. When the ore was dumped at McGill his body, of

course, ended up being on the grizzlies there. I don't suppose the perpetrator of the murder was ever found. Probably not a great deal was done about it. As I understand, from talking with people in that area, it wasn't but a few years before that, men wore sidearms for protection on the street. In other words, Ely was a rough and tough place at that time.

Did you personally see that when you went into town? Or were you mostly occupied in your work and away from that rough and tough atmosphere?

Keep in mind that I just barely turned eighteen at this particular time, and the open cribs were common in most places where there was some money, which was the case in Ely.

And by open cribs, you're referring to prostitution?

Prostitution, yes. And to a youngster, it was always interesting to walk down the street where these prostitutes were—more the curiosity than anything else, but I recall so distinctly that some of these ladies were so heavily painted up that, for some reason or other, they just scared me a little bit. [laughter] After all, I was just a kid.

Had the opposite effect of attraction on you?

Yes, it was a very odd attraction. I can recall another little incident. My roommate and I thought it would be a novel idea to explode some dynamite out in the open. And it was very easy for anyone working in the mine there to stick some dynamite in their pocket and carry it out. No problem at all. Anyway, we took a half a stick of dynamite and hung it on a fence wire and set it off, and I remember so distinctly how loud that was. You have to keep in mind that dynamite right out in the open like that,

exploding, is going to make a terrific noise—and it did. [laughter]

But did people come running? [laughter]

So far as I know, nobody paid any attention to it. [laughter]

So you were in an area that was really going strong in terms of mining in 1929. How big an operation was at this Star Pointer? Do you remember how many miners were there?

Oh, it was pretty hard for me to say. I was working on what they called the ninth level, which was the principal production level at that time, and I would say there were, oh, about thirty or forty on that level. There were four or five of us that were students.

When you say the ninth level was the principal production level, were there other levels that were being worked?

I think there was a little ore coming out of one or two of the other levels, but, by and large, the other levels had been abandoned. We were drawing the ore from the ninth level. Actually, it was called the ninth level, but if I recall correctly, it was only between five and six hundred feet deep. An odd situation there was that hard hats were just beginning to come into play. Men were just beginning to wear hard hats. Some of them also wore a kind of a black rain hat, and the hard hats and rain hats didn't look a great deal different. I recall distinctly one young wiretapper one time just fooling around and taking his little club and tapping people on the head that were wearing these hard hats. But he happened to hit somebody who was wearing a rain hat instead, and the guy didn't like it. [laughter]

Was that the beginning—the hard hats—of some safety measures that you began to see?

It probably was the beginning of safety measures, but there were not enough safety measures mentioned. There was one thing that I participated in that I should have been clobbered for when I was a youngster. Nobody said anything about it; maybe they didn't realize it. Sometimes a wiretapper, while the cars are moving, would move up forward toward the motor by hopping from one car to the next, and this can be very dangerous, because, as I said, in the caving system the ground is moving continuously, and some places the cap of the timber is down a little bit lower than others. I remember so distinctly when I was doing this one time, as I'm hopping from car to car, my buttocks being hit by the timber as we were going through. This could be very dangerous, and nothing was said about it. The chances are that management didn't even realize how foolhardy our young people could be.

Management and the U.S. Bureau of Mines, cooperatively, were very concerned about underground fires, and while I was there, what you might call a fire team from the U.S. Bureau of Mines stopped there and gave a course in using self-breathing apparatus for fighting fire. It sounded interesting to me, so I took the course. I'm glad I did. The company was very cooperative; they paid for our time for taking the course.

At that time there were two different types of self-breathing apparatus: one called the McKay and the other Gibbs. What they amounted to was a large apparatus that you wore on your back, which carried its own oxygen and also carried a means of filtering the air that you breathe. Therefore, you are breathing the same air all the time, but oxygen was added to it, and impurities and water were being filtered out of it.

Did you use one of those when you were underground?

Yes, for training purposes we used these, and after you got pretty well acquainted with using them they would build a fire underground and give you various things to do. As an example, in the smoke conditions you would be sawing timbers and possibly building a bulkhead to stop the fire. This was a good training procedure, and I appreciated everything I learned there.

They really were thorough in training you about how to deal with fires. Was that one of the main safety problems, in addition to the caving? Was fire really a hazard in the underground copper mine?

So far as I could see, I did not detect if fire was a hazard, but you always have to keep in mind, you don't know how, but a fire can occur. You've got an awful lot of timber around there, and it's dry. An interesting sidelight of one of these practice sessions—the superintendent of the mine, who was Charlie Steinbeck, came down to watch us working. One of the men on this team we called Frenchy, a kind of a humorous person—one would expect someone would play tricks on him. Anyway, Charlie Steinbeck, without Frenchy knowing anything about it, closed the valve on his oxygen just to see what would happen. [laughter] Well, obviously, Frenchy started perspiring and didn't know just exactly what the problem was. But anyway, it probably was straightened out without any difficulty. I just thought to myself, that wasn't a very wise practical joke. [laughter]

No. It sounded like a dangerous practical joke. So as a student, you got to see the timbering, the whole caving operation and how that worked; you worked as a brakeman,

worked on the ore trains. Anything else that you remember from that experience that summer?

One of the young men working and going to school and all and working this particular summer at the Star Pointer Shaft was Paul Gemmill. I remember that there were three or four of us on the Fourth of July vacation period who decided to go somewhere, so we went to see the Lehman Caves area. At that time, the Lehman Caves had just been turned over to the Park Service, and tours were not yet started, but we drove up there, and we talked to the ranger about looking around underground there in the caves. He said he'd be very happy to show us through. Being as how he would be giving tours later on, why, this might be a good practice session for him, so he showed us through the Lehman caves, and we appreciated it very much.

That night the four or five of us, just built a bonfire, and we slept out under the stars. Around the bonfire, why, Paul Gemmill recited "The Cremation of Sam McGee," a well-known Robert Service poem. I'll always remember that. I thought Paul did a great job.

He was the entertainment for the evening?

Yes, that's right. That was my first encounter with Paul Gemmill. After that, I met him several times and got pretty well acquainted with him. Pioche was his home. He was the manager of Combined Metals there. We met as students, and later on I met him out in the field. That was about 1935 or 1936, while I was in that part of the state, and we had a good chance to chat then.

So some of the people that you met when you were a student remained work contacts all through your career, is that right?

Oh, yes. One of the fellows that was working with me at Ruth, later on for some reason or another, became a dentist. Another one worked for a clay products company in the Los Angeles area, and they had a very serious fire there. I guess he over-worked himself or something; he had a heart attack at this fire. Another one, I believe, worked in the Northwest for the forest service later on. So I kept in contact with some of these people, yes.

In terms of time off that summer, was the main break the Fourth of July? Did you work seven days a week or shifts?

You work continuously. You work seven days a week, and the Fourth of July was the only time we had off. At a time when you changed shifts, sometimes you'd have a little extra time, and I don't recall we did anything special with that extra time, except maybe wander around the area there, that's all.

So you spent the summer at Ruth, and then you came back to the university for your sophomore year. So then tell me a little bit more how your education went, because this is summer of 1929. What was happening with the stock market around this time?

Well, of course, it was the fall of 1929 when they had the crash, and I don't really recall too much about that. I helped finance my education by working in a grocery store, I remember, at that particular time. I was working in something all the time. It was an odd thing. When I left Ely to come back to school I hitchhiked back. In my early days, hitchhiking was very common; I hitchhiked all over the country. I got a ride by a young man who was coming from Utah, going to Reno to work in a grocery store, and I found out later that he would be one of the managers of this store. When I found this out, why,

I got a job working in that store in off hours while going to school.

School was kind of difficult for me at that time as a sophomore. For one thing, the physics that we took was a five-hour course. That meant five credits. You met every day. I had a rough time with physics, because, for some reason or other, I didn't seem to find enough time to do my homework and study. However, I realized, and my fellow students all realized, that physics is a very important subject for anybody in engineering. I did the best I could, but somehow or other I didn't do well enough. I had to repeat some of my physics courses later on. At the same time, we were also taking some rather tough mathematics courses from Haseman, and Haseman was an extremely fine gentleman, but very rough in class. He was known to throw chalk at students. [laughter]

He would lose his temper in class?

I guess he did. He thought we were a bunch of dummkops! [laughter]

You laugh about it now. I bet it wasn't funny then?

No. [laughter]

How about your other professors? Was Haseman the most difficult? You said physics itself was difficult.

Oh, I had no problem with my instructors. Actually, I would say, in looking and thinking about my instructors, they were all very conscientious. At that particular time I had Carpenter in some of my courses in my sophomore year. He taught mining methods, and he was conscientious. Actually, Carpenter, in spite of his broad knowledge about the mining business, he did not know mining methods as well as he should have,

to be teaching the course. The students in the class could realize when the prof got a little bit confused about his explanation of a mining method, and this happened a few times. Also, he had too much of a tendency of talking about methods that were way in the past and not getting into modern methods enough. I will say, though, that he's the one that brought up the subject of open-pit mining. Mining, as we were looking at it at that particular time, was beginning to change, and with the open-pit mining becoming so prevalent, it was very often not the mining engineer, but a civil engineer that ran the job.

This was 1930, just the beginning of when open-pit mining was becoming more important. Of course, keep in mind that at Ely and at Ruth that open pit there had been going for many years. [laughter] In Utah, Bingham Canyon had been going many years. Now we have open pit-mines all over the state; we did not have them then.

So he was aware of that, as a new technology for gold mining coming into play, but there were some other things that the students felt he wasn't aware of out in the field?

I just feel that, so far as underground methods are concerned, which were still being used, of course, that he really didn't know as much as he should have about it. Well, he just did not have that experience. Much of his experience was in metallurgy—operating and managing a mill.

Rather than the underground mining, actually being underground and seeing how that worked.

Yes, but that's all right. I still give the man credit for being conscientious and being very much concerned about the welfare of the students.

What about other instructors?

I think it was about that time that we took a course in mine accounting, and Couch taught that course and did a very good job also—very conscientious in teaching the bookkeeping and cost accounting and so forth. Very important in any business, including mining.

You noted that after the sophomore year there are other professors you would like to mention, but following your sophomore year, you had a break in your schooling. Could you explain what happened?

Couch, who was not only the accounting professor, but also the secretary of the school of mines, would arrange for students to go on particular jobs. Of course, he would solicit work for them with the companies. After my sophomore year he arranged for me to get a job at the B&B Quicksilver Mine on Montgomery Pass, over the Sierras between Mina and Bishop. I was in the process of putting my little 1926 Chevy Roadster back together again; and my friend, Gerry Hartley, who belonged to the same fraternity with me, happened to be out on the back porch when I was trying to put things together. He helped me somewhat, and that's when I got acquainted with Gerry Hartley. I explained to him that when I got my car back together again so it would run, I was heading for the B&B Quick on Montgomery Pass. He said, well, he was going to a mine not very far from there where his dad was operating, and could he have a ride partway? I said, "Of course." So anyway, we set out for the B&B Quick, but after a while I decided, as long as he was going to a mine the other side of that, maybe I could get a job there. So, unfortunately, I never got to the B&B Quicksilver.

I went on beyond that to a mine that was about thirty-five miles north of Bishop,

called the Lone Star Mine, and Gerry's dad was operating that. The operation in that particular case was getting ready to sink the shaft that, I think, was a 300-foot shaft, and they wanted to sink it down to the 400 level. So anyway, I was one of the first people, I guess, hired for that particular purpose.

So that was supposed to be for the summer between your sophomore and junior year?

That's what it was going to be, but the summer ended, and the job continued. I thought, well, I had a job, and things were a little bit tough all the way around, so I thought I had better hold on to my job and go back to school later on. I stayed there, and I guess by late fall or spring of 1931 that job petered out, anyway. The Depression was hitting. I remember that we would pick up miners wherever we could, and I remember going into Bishop to what we called "the jungles"—where these men were just getting by on their own, cooking a pot of stew or whatever—looking for miners.

The jungles was where the unemployed, homeless people were?

Yes, that's correct. It's an odd term that has a very definite definition meaning: in the woods or whatever was surrounding and being close to a town. Why, these fellows would make this their home, and they would get together and pick up whatever food they could and share it and cook it.

And help each other survive?

Yes, that's right.

And that's where you would go to get miners to help in Gerry's dad's mine?

Yes, that's right.

So the decision not to go back to school that fall must have had a lot to do with the Depression then—having a job and having some income?

Oh, yes, very definitely. I had a job, and I thought I better stick to it and pull together as much money as I could to help me later on. I don't recall just exactly what followed that, but anyway, I did finally go back to school.

Let me stop and ask you, too, about the mining. Now, you were at a small mine that Gerry and his father owned. Were there still other mining jobs around, though, during this time? Was mining one of the industries where you could find work during the Depression? Did you have any awareness of that?

It was difficult. There weren't very many. That was the only mine, the only place where there was any work going on around there, yes.

So it wasn't like there was a great, wonderful mining boom that was drawing workers?

Oh, absolutely not. There was no mining boom whatsoever. They were tough times. I remember my pay was five dollars per shift, and that was pretty good for me. A hundred and fifty dollars a month—can't sneeze at that. [laughter] That was a lot at that time, yes.

That was a lot because some shifts in some other mines may have been only, what, four dollars a day?

Yes, that's right, three or four dollars, and I can remember during my sophomore year when I was working the grocery store, I was

averaging somewhere around twenty-five cents an hour.

So mining was a good job compared to working in the grocery store, and you could actually get a little bit ahead so you could go back to school with that kind of a job.

Oh, yes. Getting \$150 a month, why, it was pretty good. You could put some money away and go back to school. I'm trying to recall just what I did after that, but I did go back to school the next year.

The Lone Star mine was an old lead-silver-gold mine that had had a little bit of past production. Pretty good grade. They encountered a little gold ore, and that was the reason for sinking the shaft down to the 400 level, in order to pick up more gold ore. They didn't pick up much, but some of the ore that was taken out separately was later on milled, not by the same people that had it when I was there.

So it ended up at least making a living for the people that were working there?

Yes, somebody got something out of it.

Nineteen-thirty-1931 is the year you worked at the Lone Star Mine, and so it would have been, what, the fall of 1931 when you went back?

The fall of 1931, I went back to school. That was my junior year and the senior year for my contemporaries—those that started school as I did in 1928 were graduating in the spring of 1932, and I was just completing my junior year.

Were there others who had to slow down because of the Depression?

It was tough. It was not very unusual for people to stay out of school, and it was pretty

tough going to school, too, because money was scarce. I remember so distinctly that I had an awful time finding money for my textbooks. I had to borrow textbooks wherever I could. A Nevada resident didn't pay any tuition. However, there were some fees, but they were very low. Your textbooks were the big cost. I remember so distinctly, there was one textbook used in mineralogy class that I never did get. I just borrowed it. Finally, about five or six years ago, I found somebody that had a copy of this book, and he gave it to me. [laughter] I finally have a copy of that book!

Well, no wonder some of those courses were difficult, if you didn't have the textbook. Were you living still with your brother during that time?

Yes, I was living with my brother at that particular time.

Do you have any specific memories of your junior year, of the courses that you took? You were coming back, now, to school with experience in an underground copper mine and an underground lead, silver, and gold mine, so you had quite a bit of experience.

Yes, I had some experience, which helped me somewhat in my class work, but it was that particular year that I had to go back and do some extra work on physics courses. I also took some additional geology courses.

And then what happened after your junior year?

The year of 1932-1933, I worked at various jobs. I surmise that I just did not have enough money to go to school, and I was able to start out with a job. The fall of 1932 was probably when I was in northern California working with a company that was

rehabilitating ditches that had been used years back to supply water for hydraulic mining. I worked with them the summer of 1932, well into the fall.

Were all the jobs using your engineering background, though?

Unfortunately, that one there in California was using no background whatsoever except the shovel. [laughter]

A shovel. And lucky to get it, huh?

Yes, absolutely. I worked for people that I heard about in later years. It was a company in Phoenix that was supplying the know-how, at least. I don't know where the money came from to rehabilitate this placer operation. That was very interesting, to work here where other placering had been going along, and every once in a while we'd find a pocket where mercury had been left behind. [laughter] We panned the mercury on a shovel. In other words, you use the shovel just like you would a pan and wash the dirt away and end up with some mercury amalgam. It didn't amount to anything.

By the way, it was in this particular area that I was able to see some historic areas. Do you recall that Bret Harte wrote a story on *The Outcasts of Poker Flat*? I was able to see Poker Flat. [laughter]

When that job was finished, I worked at various jobs. One time there were three of us. We were grubstaked and made no money except our food. We worked in a small prospect, about a hundred miles northwest of Winnemucca in the Leonard Creek area, and it looked like a great idea. Here was a tunnel following a little vein of gold ore, and one spot looked real good, so we decided to sink a winze (which is an underground shaft) at this particular spot going down on the ore and figuring it might block out some ore that would be worthwhile. Unfortunately, we got

down around twenty-eight feet. Finally, this little vein of gold ore pinched down to nothing, so that was that. We spent just exactly one month there living in a tent.

Having your grubstake. Do you remember who you did that for, or was it just something you did among yourselves?

Well, Norman Annett and his brother Seryl and I were the key people involved. Norman Annett is the one that concocted the idea. He found this tunnel, and he found this little bit of ore there, or heard about it. Anyway, that's where we went. We were working on a property that was leased from a prospector, Guy Bishop, a real character in the Winnemucca area at the time.

And leasing, now was that something that was happening a lot during this time?

Oh, yes. If the prospector had a particular piece of property he thought was worthwhile, someone else would come along and lease it, with the idea that the prospector would get something out of it later on, and the operator would also get something out of it.

There were other interesting things that happened at that particular time. I met one of the early women miners. Her name was Josie Pearl. I'd heard various stories about her, so I was never quite sure whether to be scared of her or what. Anyway, she was reported to have been a madam in one of the houses of prostitution in Bodie years ago. I wouldn't be a bit surprised if those were all stories and no bit of truth in them whatsoever. Regardless of that, this is what I was told, and I, being a gullible youngster at that particular time, took it all in. I remember so distinctly, she showed me a porous, soft rock, which had gold sprinkled all over the outside, loose, and I thought, "This lady is pulling my leg. These are brass filings."

So anyway, I looked at it with a jaundiced eye, I guess, and she said, "Well, why don't you break it open?" I broke it open, and it was the same thing all the way through—gold. Little spots of gold here and there through the loose rock. I was really impressed by that sample. I'd like very much to have some kind of an idea where she got it.

So did you work with her, or did you just meet her?

No, I just met her. She had the adjoining ground. She later on was cook at the Leonard Creek Ranch, which is owned by the Montero family.

Was she someone that you stayed in touch with after you met her?

No. Well, I had heard about her afterwards. There are a few books around written on characters in mining, and I found her mentioned in one of them.

Right. Nevada author, Sally Zanjani, has just written a book about women miners, and Josie is in that book.

Yes, I ordered it.

So then, what did you do after the grubstake work, where you worked just for your food for a month?

There were little jobs here and there. The fact is, I recall being up in northern California working for absolutely nothing, or really not doing anything except existing there. Somebody else footed the bill for food, and things were really tough back then. It was also during this period that I operated a little assay laboratory here in Reno for a few months.

Your own or for someone else?

For someone else. A fellow came into town from Idaho and opened up this assay laboratory. He had all kinds of other endeavors as well, and so he was out of town. Anyway, I usually operated the lab myself.

Where would the samples be coming from?

There were just prospectors bringing them in. There was no great quantity of work whatsoever. Somebody would bring in one or two samples; that's all there was to it. About this time there was a fellow named Rink who brought some samples in—taken off of Peavine. They always ran a little bit in gold. [laughter] Thirty years later on, I guess, I tried to figure out about where this came from; and the best I could tell, the areas that were prospected by him were probably subdivided, built on now. Or at least, if they're not built on, they're so close to housing you might as well forget about them. They were good assays for nowadays. They would have been worthwhile. Oh, yes, if you had those samples now, you'd do a lot of work down there.

Well, we should tell city council. Maybe they'll stop building out there. [laughter] What do you think?

They won't pay any attention to it. [laughter] No, it's an odd thing, but take the Peavine area, particularly the Wedekind area around in here, it has the handprints or footprints of being a very interesting mineralized area, and if you were to run into this sort of a situation that you have here, elsewhere, where there was no habitation, you'd really be spending a lot of money looking for ore.

Isn't that interesting. I didn't know that. I doubt many people living around here know that, other than experts like you.

Well, students have done a lot of work around here; and it's been mentioned several times that, boy, this is sure an interesting area, but you might as well forget it now. I couldn't blame the people in head of the housing, either. [laughter] The old story, "Not in my backyard." [laughter]

So, from the assay lab, how did you get back to school? It took you a while, as I understand.

Yes. September 3, 1933, I was working on a truck, and I had an accident. A piece of cast iron clipped my left eye, and from then on I had no sight in that eye, but by a very kindly doctor here in Reno I was taken to an eye hospital in San Francisco, and they worked on it for quite a while. The final end was that, a few years later, they had to actually remove the eye, because glaucoma was so bad, there was danger of it bursting.

But you have both eyes now. What happened?

Plastic. [laughter] I only have sight in one eye, but they do a pretty fair job, you see.

Yes, yes. I see the difference.

Yes, well, you can see the movement. This happened right after I enrolled in the fall of 1933, and, of course, I had to drop out then. That was the beginning of a long period of being out of school. It took almost six months for me to be in a position where I could really go out and work, and one of my first jobs after that was in February of 1934. There were about five of us hired by a geologist named Albert Burch to sample the Longstreet Mine east of Tonopah. Very, very difficult sampling and channel sampling. I learned something about sampling from that old codger. Albert Burch and Pat Willard are

staying in Tonopah. In other words, every night he takes his samples in there, and the rest of us, three or four of us, were staying at what is called Five Mile, about fifty miles east of Tonopah. The spot is still there. We're staying with some people. The lady—I can't think of her name right now—is a veteran rodeo rider. Well, they lived there. I don't know why they were there. I don't think they owned the ranch. It's quite a large spread, really. That's one of the buildings that was on quite a little ranch holding down there. They supplied us with food and bed. This was in February. It was the first time that I had experienced real cold weather, and I remember it was thirteen below. That was pretty cold for me. [laughter]

Because you were originally a southern California boy. You remember being cold, but tell me about the channel sampling. What is that?

By channel sampling, we refer to taking what we call a moil, which is a type of chisel, which has a point. Instead of a chisel end, it has a pointed end. Using a three- or three-and-a-half-pound hammer, you actually cut a channel in the rock about four inches wide and half-inch to three-quarters of an inch deep. You drop that on a canvas on the floor of the drift; then you take that material and by hand with your hammer and an anvil you break all the pieces up to where they're about three-eighths of an inch in size, and then you roll the samples. By rolling them, I mean the canvas is laid out on the floor in the drift, and you roll from corner to corner to mix them up very carefully, and then you split that into quarters. You take one quarter of that as your sample. It's a very precise way of sampling, and it's about as accurate as you can do it. I learned that from Albert Burch. Of course, a lot of people understand that sampling method, but anyway, at that particular time I learned it from him.

So, was it a new method, or you just hadn't been around it?

No, nothing new. It's just that I had no reason to do it. Albert Burch knew when to pull the plug on that sampling. In other words, he shipped his samples in everyday. He took them into Tonopah and put them on the train or the bus to an assay office and then would get the returns back. After his first few returns he figured it was deep enough that he stopped the work. By deep enough, I mean we've gone far enough on this. [laughter]

There are even books with that title, because that's a common mining term.

That's right, yes. That was one of the jobs that put a little money in my pocket. There were a few others at that time. We were in the middle of the Depression, and things were really rough. We had the PWA, Public Works Administration, operating. I had quite a little experience in surveying. Gerry Hartley, who I was working with on these jobs, had his dad's transit. The PWA was putting together crews in the Reno area to do some precise triangulation surveys of this region. Because I had Gerry's transit we were able to go to work on this. Part of our work was also leveling, for which we used instruments furnished by the PWA. We did quite a bit of work for several months around this area. Actually, this work was done, I think, pretty much over the state, but our particular crews were working in western Nevada.

When you say "precise triangulation surveys," what was the goal of getting this information? Do you know, or was it just something that hadn't been done?

Accurate surveying of the area in which you set up monuments, and you know very precisely where they are. It's a type of surveying that is now no longer used, because we have

instrumentation that's much more accurate. Then the Leviathan Sulphur Mine was opening up, and we had an opportunity to go to work there. Three of us that were working on these survey crews, all involved in mining, went to work at the Leviathan Sulfur Mine, which is twenty-six miles by road south of Gardnerville. The Leviathan Sulfur did work more recently by Anaconda, who needed sulfur for the making of sulfuric acid, which they used at Yerington.

What was your job at the Leviathan Sulfur Mine?

Well, I was just a mucker, I guess. I was part of the crew that was driving a drift, but I also did a little surveying for them, as well. I don't think that lasted for more than three or four months, and then they decided that it was not economical to make the sulfur there. I was out of school five and a half years altogether.

It sounds like most of your jobs were like three and four months. Is that about right?

Yes, they were very short. Also, along that particular period of time, I was on a survey crew for the U.S. Geological Survey, which was trying to lay out potential dam sites in this part of Nevada. We started out on the Little Humboldt River north of Winnemucca, and then we worked on two branches of the Carson River out of Gardnerville. Then, somewhere about 1935, I went to work for the Nevada Highway Department, wherein we made rough surveys of all the secondary roads in the state of Nevada. That was a very interesting job, because it gave me an opportunity to see a lot of the state I'd never seen before and learn a lot about Nevada.

What was happening in mining activity around the state? You must have gotten a

good sense of that while you were surveying roads.

Mining was not doing very well. A few mines were operating. There was a little activity in Virginia City at that particular time. I remember there was a mill operating there, flotation mill. I think it was all underground ore.

And then, around the state, were there small mines going? Any large operations at this time?

I believe Pioche was operating. Of course, Ely was operating. That was probably about the time that Rio Tinto started north of Elko, Mountain City. That was a medium-sized, underground copper mine. Very high grade. Pioche is the lead-zinc. It's principally zinc. Ely is copper. I don't know of anything going on at Austin or Eureka or Silver Peak at that particular time. Little, if anything, going on in Goldfield. I believe there was a little activity in Tonopah, and there was some east of Tonopah. There were several small operations. There was an attempt to mine and mill some ore near Eastgate, which is on U.S. 50 at the foot of the mountains before you get to Austin. Wonder Mine is about forty miles east of Fallon. Oh, north of Gabbs there was a little mining camp there. There was probably a little work going on there. A lot of it was leasing.

So maybe one or two-man operations, just very small pockets?

Yes, that's it, very small and shipping their ore to mills. That's about the time that I think the Westgate Mill was operating, oh, thirty, forty miles east of Fallon. That was strictly a custom mill. It was very, very dif-

ficult for everybody and everything. I went back to school in January of 1938.

Did you work on this highway department job up until then?

Yes. The highway department job is what kept me going for a little more than a year. I started with them in 1935 and worked for them pretty much all of 1936. Then in May of 1937 I was married. I had some vacation time coming from the highway department in 1937, and I was able to get a job doing some claim surveying out of Winnemucca on a small mercury prospect. Gerry Hartley and I went out there and surveyed these claims, and I ended up with \$265. Being as how my wife was working, why, the \$265 allowed me to go back to school in January of 1938. She supported me and helped type my notes. Juana worked for L.C. Griffin Jeweler in Reno for quite a while, and that kept us going.

I graduated in December of 1938. At that particular time the semester ended just about at the end of the year. Because I had done so poorly in my grades and so forth previously, I had to complete forty-four hours in that one year. That's twenty-two hours a semester, which is a very heavy load. However, because of past experience and the help of my wife, I was able to do it without any problem, at all. The fact is, I was on the honor roll. That was a very good year for me. I did well in school, and everything was going beautifully. My schoolwork in my senior year tied in pretty well with what I had seen on the outside, and it really helped me quite a lot. I learned quite a bit about metallurgy, particularly cyanidation, in school, which tied in directly with what I had done previously and what I would be doing later on.

Was cyanidation a new process? That's a milling process, correct?

Yes, cyanidation is one method of extracting gold and silver out of the ore by dissolving the gold and silver. I first was exposed to this on a job that I did not mention to you, and I forgot about it, but at the Silverado Mine south of Wellington, Nevada, in about 1935. That was my first work with cyanidation. The cyanidation is a very old process. I don't know how far it goes back—somewhere around the turn of the century. I know that there are books written on cyanidation that tied in to about 1910.

So you actually had experience on the job before you studied it in school?

Yes, I did, very definitely. I learned cyanidation right in a mill. I learned *something* about cyanidation, at least, and then I picked up a lot more of it in school. I got the background of it. Interesting thing about cyanide and how dangerous it is and so forth, and the average fellow working in a mill at that particular time would have had the same experiences I had. In order to test solutions—to determine the amount of cyanide and alkaline in the solutions—we would use a pipette to draw a known quantity of the solution and put it in a beaker to test it. In drawing the solution, sometimes you would be taking it out of a beaker that was a little bit low, and if you were so careless as to pull some air at the same time that you pulled the solution, you would get a mouthful of cyanide. The average person, after hearing the dangers of cyanide, would be shocked by this thing, but I found at that particular time that it is absolutely impossible for somebody to drink cyanide solution. As soon as that hits your mouth, you spit and spit and spit. It's awful! [laughter] Your body rejects it, because,

apparently, as soon as it hits your mucous, which has a certain amount of acid in it, it must cause the hydro cyanic acid gas to form immediately, and that you cannot stand. Of course, it's deadly, but you don't have to worry about swallowing it.



We're going to go back and pick up a couple of items that we missed. You wanted to share some information on the Depression era and sulfur mining?

Yes. I recall that there were four of us—all mining engineering students or graduates—who were working for the PWA doing surveying, which was one of the jobs that the government put out in order to allow people to sustain themselves. We heard that the Leviathan Sulfur Mine, which is about twenty-six miles south of Gardnerville by road, was opening up, so we went down there, and we got jobs with them. The principal operation that we were working on was driving a drift by conventional air-operated drills. At the same time the mill was producing a small amount of sulfur from the ore.

Did you live there while you were working there?

Yes, the camp was so far away from everything. After all, it was thirteen miles off of what we now call Highway 395, and the next twenty-six miles south of Gardnerville. So it was pretty well out in the boondocks, and we all lived right there. We worked the usual around-the-clock shifts, whereby, every two weeks or so we'd have a certain amount of time off, and during that time we usually came back into Reno.

I worked there about four months on shift work. After that I went on to other small

jobs here and there. Leviathan Mine was later used as a source of sulfur by Anaconda Company when they were operating at Yerington. They required the sulfur for sulfuric acid for their acid leaching of the copper ore.



Did you want to go back and talk about a couple of the professors at Mackay School of Mines?

Yes. In regard to the School of Mines engineering department there were a couple of professors who really made a terrific impression on me, particularly, Irving Sandorf, who was the electrical engineering professor and taught a course in electricity for engineers. This was a required course for mining engineers. I found it to be an excellent course, but particularly because Irving Sandorf was very meticulous in making up his preparatory notes for the lectures and doing an excellent job in teaching in general. I found later that I was not the only one who thought that Irving Sandorf was an excellent professor.

Were the things that he taught particularly helpful to you when you got out into the field working?

Not particularly, because it just so happened in my field of work I did not run into these particular problems, but I think it was very valuable. I learned a little bit about electrical engineering in general.

The other professor that I thought was very good was Walter Palmer in the Mackay School of Mines. Palmer was the director of the analytical laboratory. Because of the many samples of Nevada rocks coming to him, he gained a terrific knowledge in Nevada minerals. Undoubtedly, Walter Palmer was the best mineralogist that we've ever had in this state. One would ordinarily think that

Vince Gianella would fit this particular position, but Vince would have been the first one to say that, no, Walter Palmer was far ahead of him in the understanding of the mineralogy of the minerals found in the state of Nevada.

Walter Palmer thought that it was extremely important for the students in the Mackay School of Mines to have a good knowledge of mineralogy, because when they would get into metallurgical problems, it was much easier for the operator to understand metallurgical problems if he had a good understanding of the minerals that he was dealing with. Walter, in his squeaky voice, would continually hammer on the idea of metallurgy students learning more about mineralogy.

Other than that, I would say I thought all of the professors that I had in both the Mackay School of Mines and other engineering, were very good. No complaints.

From your perspective, since you were in school and then had to take some breaks working in the field, did you feel that state-of-the-art technology was being taught in school? And were you seeing it on a day-to-day basis out in the field?

What you were taught in school was a good background, you might say, but to me it was worthless without the experience you picked up in the field. As an example, I took a course in technical writing from Dean Sibley, a conscientious man, by the way, very low profile. He did his best to teach me a little bit about technical writing, but I found later that it was practically worthless, as compared with what I learned by actually sitting down and doing the job. Conferencing with other engineers and geologists about my technical writing, various people in the U.S. Geological Survey, in editing some of the material that I wrote, gave me far more information than I'd ever, ever got in school.

So it was really the experience, combined with the philosophy from school, that completed your education.

Yes. That's right. Well, what I learned was of some use, but it needed an awful lot of polishing from the outside. I think so far as the metallurgy—which, when I got out of school, was the first thing I tackled—I benefited very definitely by what I learned in school, but, again, the practical experience was very valuable and absolutely necessary to give me a better knowledge of what I was trying to do on the outside.

Vic, you mentioned something about metallurgy students needing to know mineralogy. Would you explain that in more detail to me?

Any mining engineer or geologist is required to take quite a lot of mineralogy. It's absolutely necessary for him. Metallurgy was Walter Palmer's field. He insisted that the student have a good understanding of mineralogy, because, in order to properly separate the various minerals in a rock, it was necessary for him to understand the peculiarities of these minerals. Walter emphasized this tremendously, and he was absolutely right.

And was this something that wasn't normally emphasized?

I don't believe it was. I don't know of any other prof that emphasized this like Walter Palmer did. He was dead right, right down the line, that it was necessary to have a good understanding. I remember so distinctly, he would give us these rocks. You'd think this was a class in mineralogy, but it was not. It was a metallurgy class, and he would ask us to identify the various minerals in the rocks. I suppose some of us thought that this was rather peculiar in a metallurgy class. It was important to understand the

mineralogy, so that you could figure out how to separate these various minerals. It's very basic, but very often some of the most obvious things are overlooked.

Silver Peak, Nevada, was your first job after you graduated from college in December 1938, and then from Silver Peak, you talked about another job in northern California. Could you describe that job to me, please?

At Silver Peak, I worked with Gerry Hartley, whose dad had a small gold mine in northern California. And it looked like there was a good possibility there of making it a good producer. It was a narrow vein of adequate gold content, and it had been worked previously. There was a small mill on the property. We added sand-leach cyanidation to this mill, with the idea that the ordinary amalgamation as used in the mill usually only recovers about 50 percent of the values. We thought it would behoove us to get more of the values out of the ore by using sand-leaching. Well, the amalgamation in the mill worked fine, but the sand leaching didn't work so well, principally, because I could not seem to get the zinc box precipitation to work properly.

Zinc box is a method whereby the solution, which contains gold and silver, passes through shredded zinc, and the gold and silver precipitate on the zinc, and the solution comes out at the end of the box more or less barren. The only problem is that, if things don't work just exactly right, the cyanide solution chews up the zinc, and you end up with nothing but a mess, and that's what I had. It's commonly referred to in the business as zinc shorts.

And did you ever find a solution for that at that mill?

Oh, no, not entirely. It was pathetic. When we melted the zinc precipitates we got so little out of them that it just wasn't

worthwhile. The operating of a zinc box precipitation properly is an art, and one of the artists in this would have been Bill Donovan, who operated down the canyon in his custom mill just below Silver City for many years. He was a real expert at this. It didn't work for me because I was an amateur. [laughter]

I see. At that point, you had your degree, but you were still considered an amateur. What happened after your northern California experience? What was your next job?

That's when I very happily got a telegram from my wife saying that the Department of Education would like to talk to me about teaching an itinerant prospecting class. If I remember right, the offer was \$250 per month. That was great at that time. It was a steady job for about nine months out of the year. These prospecting classes operated during the school year, because they operated in public schools, usually in high schools. These classes would ordinarily last three or four weeks—three weeks if I only taught mineralogy and geology, but four weeks if I also included a course in fire assaying. However, in some places the school preferred to have the class there for four weeks, whether I taught the fire assaying or not. All of the classes were taught in Fallon, Virginia City, Winnemucca, Elko, Beowawe, Rio Tinto, Getchell, Wadsworth, and Eureka. We were sticking just to northern Nevada.

And so you would go out for a month to these locations, or was this a one-night class?

No, I would travel. In other words, I would go to a place for, say, three weeks, and then I'd pack up and go to the next spot. Travel was only from school to school. They were all evening classes, every night of the week, six days a week, if I remember right. I would try to set up a field trip on weekends

or on Sunday. The attendance was anywhere from ten to twenty-five, but it's very difficult to keep a class like that going. You try your best to make it interesting, but, for one reason or another, there's a lot of interest at first, and then it slows down. In other words, you're asking students really to use their head and study a little bit, and a lot of these people are not inclined that way. They'd rather you tell them stories. [laughter] Never mind having to learn something about geology.

I see, so it was a little bit of a struggle for the teacher. So nine months out of the year, this is what you did. You would go from spot to spot and teach class.

Yes. In the summer I would find something else to do.

What did you think of teaching?

Oh, I enjoyed it. I had no problem with teaching, whatsoever. By the way, we also had classes at the University of Nevada, Mackay School of Mines. I forgot about that. Again, they were strictly evening classes for adults. I don't think it was legal for students to attend these classes, because the idea was that the Department of Education set up other facilities for them.

And did people get credits for this?

No.

It was just continuing education type of thing? Adult education?

Yes, continual education, but also the idea of a fun avocation. That was the general idea. Most of the students were already interested in prospecting. They already knew something about it. One of the places I have mentioned that I had classes was at Rio Tinto Mine, and that was interesting

because the best specimens of crystalline native copper came out of the Rio Tinto Mine, and I had an opportunity to see some of these and get some of these. Unfortunately, I did not make a collection of them, and I don't know whether a collection exists. A lot of it is probably there in some of the waste dumps.

So that was exciting to you to see that? And you must have gotten a sense then of the kinds of work going on, because this would have been late Depression years, correct? Right before the war started.

Yes, 1938-1941, and it culminated with the bombing of Pearl Harbor, December 7, 1941, when I had taken a field trip out in the Schurz area from my Fallon class. We came in, and at the first house we stopped, this fellow and his wife came out and told us Pearl Harbor had been bombed.



I mentioned I also had a class at Beowawe, and there I was fortunate to visit a little silver mine owned by the Fallini family and there had the opportunity to see native silver—a very interesting mine. They had operated it on and off, but it was very difficult to make a profit at.

For someone who doesn't know, what is native silver? Why is that unique?

It's like native copper; it's crystalline native silver, and some of it doesn't actually look crystalline. It is crystalline in the ore. You find little strings of it in the rock. It's very pretty.

I might mention that I made many friends, prospectors, and one of them particularly was Cy Cox in Fallon, who is long since dead. He was in these classes, and he was a real character. He operated a small garage in Fallon. I say "operated." That's a

slight misnomer, because he had a garage, but I think he spent most of his time prospecting. He didn't do much work, actually, in the garage.

A good example of gold fever, is that what that was? [laughter]

Yes, well, I guess so. I had seen him with real gold fever. I saw him panning something at a little prospect one time that he had, and all of a sudden he ran into a real hot spot, and he really went wild. [laughter] But Cy Cox was an interesting person. He probably knew more about lost mine stories than anyone that I had ever run into. His belief was that by trying to follow up lost mine stories—to try to actually find the mine, the general locality—in that way he found other prospects that were worthwhile.

So you must have met a number of people who had their own little family mine, or they went prospecting on their own all around Nevada?

Very definitely, yes, and usually, it was these people who knew of a little prospect that they would like to have me go out and look at it, and I'd make a field trip out of it. This happened out of Fallon quite a bit. I believe it was Cy Cox, in this particular case, that had a prospect that we went out to visit. It was a patented claim that had free gold showing, and the locality was a few miles east of Brady Hot Springs, now commonly referred to as just Hot Springs. We went out there, and sure enough, you could find little specks of gold here and there. Other mining had been going on in the district. It was a worthwhile area.

So there were several of these around Fallon when you went and taught there?

Yes, that's right. Of course, this particular property is quite a ways from Fallon. I

remember that particular trip, why, Peggy Hatton—later Peggy or Margaret Wheat—was in the class, and she brought the lunch for our picnic. Part of the lunch was pickled pigs' feet, and Cy Cox always used to refer to Peggy as "Pigs' Feet Gal." [laughter]

Was that a popular picnic item?

Well, I never ran into it before or after, but it was great.

So that was Margaret Wheat—Peggy Wheat—who did a lot of work in this area with the Native American Indians?

With the Indians, yes. Another interesting sidelight is that about that same time the Nevada Department of Health would send itinerant dentists around to various schools in the boondocks. My dentist at that time was Sieffert in Reno, and, lo and behold, I met him at the Getchell Mine. He was there to take care of the teeth of some of the young children, where it was difficult for them to get out to a dentist. It was pretty isolated at that time.

So the families were living at the mine?

Oh, yes. It was through the school system, too.

I wanted to just pursue this topic a little bit more, because you've talked about various people doing some prospecting on their own or a family mine. Was that very commonplace for people to do at that time, to supplement their income? I mean, can you give us some other examples of that?

Yes. Oddly enough, some of these prospectors did supplement their income by doing this. I remember one in the Fallon area, a fellow by the name of Fred Erb. He had a small operation, if you want to call it that, about seventy or eighty miles east of

Fallon, and he found that there were some high-grade stringers in this very soft, talcy ore. He set up a homemade mill and was able to make a little money out of it. Years later I examined that property, and I could see where he had worked his stringers. Other companies had attempted to make a mine out of this by working it on a larger scale, but I don't think they were ever able to do it.

Was it the type of situation where only a small-scale operation could be successful?

I believe so. That's the way I looked at it. I felt that a couple of fellows working together could dig out these stringers and amalgamate that in a small mill, but to try to move very much of that rock was practically impossible. It was hardly rock. It was a very, very soft material. You couldn't make a profit out of it. There just wasn't enough mineral in the rock. That's the problem. If a couple of men worked these high-grade stringers and would pan it once in a while to see how everything was going, that's fine, but to try to make a mine out of it, that just didn't work out.

Do you recall running across other examples like that when you were out teaching? You said some of these small, little mines provided the field trips for your classes.

Well, the one that we visited on December 7, 1941, was a silver-lead-zinc property near the east side of Walker Lake, and it was interesting there to show the students that you could find spotty higher grade silver ore near the surface, because of the surface concentration of this ore, but other than that not much there. Underground, it was truly not enough mineral.

What happened to these classes after Pearl Harbor?

After Pearl Harbor—for those who were old enough remember—lights were out because of the threat of bombing, and you had to either leave your lights off or seal your windows so that the light could not shine through. I believe the automobile lights were more or less stopped because of the danger of bombing. Keep in mind that this was in Fallon; we weren't very far from the ammunition depot at Hawthorne, and that was one of the reasons that we were more or less vulnerable. I tried to keep the class going for just a few days after Pearl Harbor. About that time the War Department was looking for people to examine the various mining properties on bombing and gunnery ranges in Western states, and I was more or less drafted to go into this type of work, so that was the end of the classes. I had been previously talking to someone involved in the War Department about this work, and I was not particularly interested, because I had a job and I was doing it, but after Pearl Harbor the people they had in Reno War Department came along and said, "Well, we'd appreciate it if you'd come in and help us on this," so we did.

Did the Department of Education end your classes when you left there—those itinerant prospecting classes?

Yes, they were stopped then. Prospecting classes did occur after that, but they were not the same as what I had. Fact is, one of the reasons I came back to Reno after being gone for about twenty-one years was because I found out that the Mackay School of Mines was putting on a similar class in geology for prospectors, you might say, where they definitely said, "If you understand prospecting and mining, you're in the wrong class. This is strictly for amateurs."

We wanted to talk in a little bit more detail about the kind of work you were doing for the War Department.

You recall that December 7th would have been the wintertime. The work at the War Department started the winter of 1941-1942 on the Tonopah bombing and gunnery range, wherein we examined as best we could the various mining properties, improvements on them, and what we thought their potential might be, in order to determine in some way how the claim holder was being damaged by not being allowed to go onto his ground. We covered quite a lot of ground in Nye and Clark counties.

So you were out checking on individual small mining claims?

Yes. There were no large ones involved. We also worked in California near Marysville. We were in quite a bit of Arizona and New Mexico.

When you assessed the mines, what kind of information did you give to the War Department on those mines?

Well, we sampled the mines, and we gave them the sampled results. We gave them information as to the improvements that had been made on the mines, and the amount of money that the claim holder had spent on this property, and other information they wanted. Later, a different group in the War Department went out and settled with these people.

So you wrote the report, but you never knew the end result for the individual miners?

No. Could have gotten it if we'd have been interested. Too much red tape to try to get that information.

Did they actually buy the mine from the person, or did they just pay them? Were they ever allowed to go back and work those mines?

No, they were not. I don't know that they were ever allowed to go back, simply because those bombing and gunnery ranges still exist.

So again, you were doing quite a bit of traveling. Camping out or staying in Tonopah?

My wife stayed here. She worked at the Herlong ammunition depot, and I was in New Mexico while she was doing that. However, some of the traveling we did together. She did not travel with me on the jobs in Nye and Clark County, and I would come back quite frequently. Then in California we had a trailer, and the people at one of the parks in Grass Valley were very kind; they allowed us to park in the park while we were doing sampling on what was commonly referred to as the Marysville Cantonment Area. It was set up as a rough area for practicing tank warfare.

So, is this the job that you held all during the war years then, or was it a short-term project to assess those mines?

That work was finished about 1944, if I remember correctly. After that I worked in a small mercury mine near St. Helena, California. Oddly enough, I was working for Conrad Martin, who had been one of the appraisal engineers for the War Department, who I'd also gone to school with, and who I still keep in contact with. He's a consultant here in Reno now. About that time, my brother's wife died. My brother was in the insurance business in Los Angeles, and I went down to Los Angeles to be with him a while, because it was a traumatic experience for him. I got a job in the shipyards for about three or four months, and then I got itchy feet for mining again in Nevada, and I found that I could go to work for the U.S. Bureau of Mines drilling iron ore in the state. I did quite a little drilling east of Lovelock, and

then I also explored a fluorspar deposit about fifteen, twenty miles northeast of Lovelock, and then I drilled an iron deposit out of Gabbs.

Tell me a little bit about what was happening in the mining industry during these war years, because we know that there was major change caused by the war.

Yes. The mining industry was pretty dead about this time. However, there was a lot of activity at trying to mine tungsten wherever they could, because it was a strategic metal. One would expect mercury to be good about this time, but I don't think it changed a great deal. There was probably a little bit more mercury mining going on.

Nevada is a very important tungsten source, and the Nevada Massachusetts was operating at full swing, and there were a lot of small tungsten mines around. Nevada Massachusetts Mine is north of Imlay, Nevada. By the way, for many, many years that mine was the principal producer of tungsten in the United States. There was a small tungsten producer east of Fallon, and there was a mill in Fallon that was concentrating ore.

And then you talked about fluorspar. Was that after?

No, it was before. That fluorspar drilling I did for the fluorspar exploration was at the same time, more or less, tied in with the iron. I finished the drilling of the iron at Lovelock, went to the fluorspar, and then after that I went to Gabbs where they drilled iron.

This was all for the U.S. Bureau of Mines. What was this exploration for? What was the purpose of it?

Well, it was found that there was some iron ore in Nevada, and there was a need

for a domestic iron ore source. I guess that was the principal objective.

The need was caused by the war, or was it caused by the demand after the war?

I think it was caused by the war itself. Nevada iron ore deposits are largely magnetite, that is, they're high-grade magnetite running about 60 percent iron. The type of ore we have in much of Nevada is what is known as a hard lump ore, and that ore was necessary in the open-hearth furnace method of making steel, so that's why Nevada was important for iron ore. See, in the process the iron ore goes through the blast furnace and comes out as pig iron with a high carbon content. Then that is refined in the open-hearth furnace by dumping this hard lump ore in the melt. Our role was to find new sources, find out something about the quantity of iron ore in these deposits that had been found. Some of these deposits were known for a long, long time.

So it wasn't all new exploration?

Oh, no. It was not new exploration, at all. It was a matter of extending iron ore reserves on known ore deposits.

And so this took you all around the state, and this was towards the end of the war that you were doing this—right before the war ended? Anything else going on in Nevada at that time? Was that because the war placed limits on precious metals?

Well, the Baxter fluorspar deposit east of Fallon was operating all during this time—a very important operation.

What is the fluorspar important for?

Flux. Good flux for any melting. It simplifies the melting and removal of impurities and so forth.



We were just talking about the skills of underground mining.

Well, you were mentioning that Russ Fields told you that these underground skills are being lost. My comment is, that's an error. They're not *being* lost. They were lost a long time ago. I recall when I was at the Rio Tinto Mine giving one of these prospecting classes. That was about 1944, I believe. I was talking to people at the mine there, and their problem was that they had to teach men underground mining—how to handle themselves underground, how to use the equipment, and so forth. So it was about that time, and even before that, underground miners were just gone. That's all. They died off, and no new ones being trained except at places like the Rio Tinto Mine, where they had to. That was not the big beginning of open-pit mining, but for one reason or another, underground mining became less important. A lot of the mines, the underground mines, were probably shut down for economic reasons.

For the war?

That's one reason, and then gradually after that we were able to get along with lower-grade material, which could not be handled underground, but was handled by open-pit methods. That brought an entirely different breed of people into the picture. That brought in people that had to be trained to use extremely expensive equipment—these trucks. We're talking about stuff that cost maybe up to a half a million dollars that

one man is handling, and he has to be well-trained, because it could be a terrific loss.

But that's much different than the skills—like the drilling and the blasting and the mucking and so on—used underground.

Absolutely, yes. I don't really know just when we lost people there, but it was about that time and before, that we lost that know-how. I remember in the 1930s, there was no problem in finding underground miners, because, of course, those were the Depression years. I remember in Bishop we went down to what we called the "jungles" to look for underground miners, and there was really no problem in finding them. These people were experienced. During the Depression men would be just knocking around and have very little, so they pooled their resources to camp in the woods and cook food. These were experienced, intelligent men, such as a hoist man I found there. They had the skills. They were the ten-day miners, as we called them at that time. That meant that they worked on a job for a short period of time, and when they got a few sheckles in their pockets they went off. And it was "deep enough." [laughter] [In mining the term "deep enough" sometimes means "I've had it," and is used when miners are ready to leave a job.]

Deep enough, they left. That's interesting, because some people are thinking that underground mining skill was lost later, when the big open-pit mining started in the 1960s. And you were seeing it twenty years before that.

Oh, yes, yes. It was lost way before that. I think it was economics. The underground mines just couldn't pay off, and they couldn't survive for one reason or another. I don't recall enough about the price of metals and so forth, but when I first went in under-

ground in 1929, why, the price of copper was very good, and then the crash had probably as much to do with shutting down the underground mines as anything else. The prices of metals dropped, so they couldn't continue mining underground.

And yet, there was still a fair amount of mining activity, from what I understand, in the 1930s. That would have been small operators?

Well, there were a few small operators and those larger operations that could just make it economically, that's all. A lot of them couldn't, so they had to kind of slow down.

Because mining was one of the jobs available in the 1930s here in Nevada? I mean, you worked in mining, and you were able to find jobs.

Yes, I was able to. I was just fortunate enough to be someplace where they were. As an example, I remember in the 1930s working at a place where they were rehabilitating a hydraulic mine in northern California. Well, people were investing in that, and the price of gold had gone up to thirty-five dollars, and that made everybody in mining a little bit more able to survive. The small fellows probably were better off, because they could move quicker, so far as taking advantage of the prices of gold. They can get in there and get the ore out and ship it, or whatever's necessary, quicker than a large operation. Might take them three years, you know, to get themselves all set up.



Now, would you say again what your degree is and what your experience is?

Well, yes. At the time I started at the Mackay School of Mines, the curriculum was

more or less evenly divided between mining, metallurgy, and geology. We also had some electives, so you could branch out a little bit more in any one of these three avenues. My objective was to get an education as broad as I could in all three., therefore I graduated as a mining engineer. With my original curriculum everybody graduated as a mining engineer. There was no difference. Later they started specializing more, and I was probably one of the last that graduated in that broad-based curriculum.

It so happened that my first job out of school was in metallurgy. A lot of my experience, previous to going back to school, was in metallurgy. However, it wasn't long before I got into geology and geologic exploration, principally through teaching the prospecting classes in northern Nevada. That had more to do with broadening my interest in geology and geologic exploration than anything else. Following that I just went into other avenues of mining, and they were usually in the exploration field. That's been the focus. My first job in mining was strictly underground mining, prior to graduation, but after that it was more geology and exploration than anything else.

You said also that most of your work was with small operations. Could you give me some details and examples?

My first job out of school wasn't really a small operation. I was in metallurgy at the Cord Mill, which we've gone over before. The next one was where we tried to make a small mine in northern California pay, and that was a very, very small operation. We built a sand-leach tank and the necessary cyanide precipitation boxes. After that I went into teaching prospecting classes. Then it was a matter of the war coming along, and I was examining small prospects. I worked for about a year near Bishop in a small gold operation. It was really not an operation. We

were sinking a shaft. That experience was strictly mining. I learned quite a bit about the handling of machinery necessary to keep a small operation like that going.

In a small mine in those days, you had no electric power line going in, and you had to have engines that would power your compressors and power your generators. Your generators were not so important, because you could get along with very little in the way of electricity for lights. However, come to think of it, we also had one pump that was electrically operated, but most things around mines were operated by air. Therefore, the compressors were very, very important, and you had to have equipment to power those compressors. Your hoists were probably an old-time Fairbanks Morse one-lunger. By that I mean a single cylinder—very common in those particular days. By the way, the last time I saw one of these operating was at the Crowell fluorspar operation in Beatty in about 1950. That type of equipment is now a museum piece. The other was strictly a four-cylinder gas engine—very simple hoist—but very efficient.

In later years I was again in the Bishop area, and there were about three of us involved in the small group. We did some diamond drilling on a tungsten property and also mined tungsten ore, as well as milled the ore in a small mill we were able to rent. There was a young man that I went to school with—a middle-aged man, actually. His name was Otis Kittle, and he was interested in investing small funds in mining, and so there were about three of us involved. We were trying to find something worthwhile to work on, and all we found was a little tungsten deposit out of Bishop. He put up the money to purchase a second-hand diamond drill, and we operated this in order to find more ore in that mine. It so happened that our diamond drilling was not successful. There was a little of the ore left. Continuing the mining, we were able to take out enough

ore and mill it, and it helped pay for the operation, but in the end it didn't make any money for anybody, and at best we more or less broke even. This was after World War II.

Was tungsten a metal that was pretty much in demand all through the past, or did it change in terms of world market demand?

Tungsten was in demand at a good price. It was important during the war years and even after the war years. Tungsten is an extremely important ingredient in tool steels. It has the property of holding its edge at red-hot heat. I shouldn't say red-hot. Red heat. In other words, a tool can be red due to the heat and still operate. Ordinary steel becomes very soft when it's red. Tungsten steel, not so. During the war tungsten was used somewhat in armaments, but usually its importance is in tool steels. After the war a lot of industries were retooling, and that made tool steel more important, too. I don't know just when the price went down. Finally, imported tungsten was so cheap that the tungsten mines here in the United States pretty much shut down.

Right, but all during the time that you were working through the 1940s and 1950s, the price was high?

Yes, the tungsten price was good.

You said the diamond drilling was not successful, and yet you were able to get some of the tungsten out. Can you explain? Was the diamond drill something new?

Oh, no. The diamond drilling is a very old exploration process. We used the diamond drill to find a deep extension to the ore, but it just didn't work out. We didn't find anything, but there were some old stopes over there, and we continued on those

stopes, and we were able to pick up a little extra ore just by following the ore, you might say. That's an old adage: when you have an ore showing, stay on it.

Was there a particular method that you were using at that time?

They were just strictly open stopes. Simple way out. It's just very simple drilling and blasting.

Earlier we got onto several subjects, and one of them was the hearing loss that you said might have been caused by the diamond drill. Could you go into a little bit of a comment about safety procedures? What kind of safety procedures were used when you were first in school and out in the field?

Well, unfortunately, in those days in a small operation there were very little in the way of safety procedures used. I recall the diamond drilling. Obviously, we should have worn earplugs. Even with earplugs the whine of the high-speed turbine engine on the drill was excruciating. Hard on the ears, and you're deaf for a while after using that piece of equipment.

By the way, I forgot to mention, while I was with Otis Kittle we found a small lead-zinc property about twenty miles south of Gardnerville. We tried to find some additional ore there, and some of this involved using jackhammer drills. There again, we ran into something that's very hard on your ears, and that might have had something to do with my loss of hearing, too. We did a lot of work there, but we didn't find any extensive ore. We found little bit of ore, but not really worthwhile.

That's about the end of the small operations that I can tell you about, except that it was very unfortunate that with small operations like this it was very common that the safety procedures were not what they should

have been. However, a lot of it was just plain ordinary judgment that protected the people. I remember so distinctly at this mine down in Bishop, being a young fellow—kid, you might say—I was down the shaft, and I noticed that by hand it was kind of interesting to see how I could swing the cable—reach up and swing the cable back and forth in the shaft. This was of interest to me to see the cable whipping back and forth like that, I guess, as a foolish kid would do. Anyway, when I got back up to the top, I was told in no uncertain terms, “Don’t fool around when you’re underground. Don’t do things like that which are absolutely unnecessary,” because, obviously, the hoist man at the surface had no idea why I was messing around with that cable, and not knowing what’s going on, why, you could imagine that there’s some problem. There was no problem, of course.

He might think it was an emergency?

Yes, that’s correct. But there was none and, in other words, just plain ordinary horse sense tells you when you’re underground, don’t mess around. Everything has a purpose. Follow through the way things are supposed to be done. Don’t try to do something that’s absolutely unnecessary like that. In a few minutes I learned a lot. No one was hurt. I was just told, and I thought about it. I was wrong.

Your degree is in mining engineering, and yet, most of your career has been in exploration. Could you talk a little bit more about that?

My experience in exploration started with teaching prospecting classes, because I had to really brush up on my geology to teach the prospectors. Then, when examining prospects on these various gunnery and bombing ranges during World War II, it was necessary to understand a little bit about

the geology of the ore deposits involved in order to give some idea of the potential of a property, and one thing always led to another.

Finally, when working with the Ford Motor Company in the Upper Peninsula of Michigan, it was necessary for me to learn something about the geology of the iron deposits there, because I was looking for more iron deposits. Later, we decided to see if there were base metal deposits involved in the same area, and we did a lot of field geochemistry, and here was a method that was taught to me by some exploration geologists from a Canadian company. I followed through by learning more about this method and used it for several months with a crew of about six people in the Upper Peninsula looking for copper-lead-zinc deposits.

After I left Ford Motor Company nothing was done to follow up the work that we did, but I still think that there’s a possibility for some other base metal deposits in that area. Unfortunately, I was interested in geology and prospecting, but Ford Motor Company decided they were not interested in prospecting. At the same time, before I left, I also found out something about manganese nodules or pellets being on the floor of the lakes, like Lake Michigan, and I did a little exploring there with necessary tools, scraping the bottom of the lakes to find out more about these pellets. They develop under certain peculiar oxidizing conditions.

You were talking about your time with Ford Motor Company. My understanding is that it was an important time. Ford Motor Company was taking the leading edge in terms of the exploration they were doing and mineral resources they owned. Can you fill me in on that?

Ford Motor Company, in order to be assured of having good sources of various metals that—iron, lead, and everything

else—you have to go back to old Henry Ford. He wanted to be self-sufficient in everything, even to the extent of trying to have his own rubber plantations in South America. He had a lead mine in Idaho somewhere, because he wanted to be assured that he could get the lead for his batteries. Part of that same idea, that same philosophy, rubbed off on later people that operated Ford Motor Company. To this extent, maybe it was not necessary for them to mine their reserves, but it was handy to have their reserves so that others could not stick them with too high a price for these resources.

Therefore, at one time, I went out to find a glass sand deposit for Ford Motor Company, because they wanted to be sure that they had a backup that they could use, so that someone could not charge them a higher price than what they wanted to pay, and this is sort of a psychological thing. If the people that sold them the glass sand knew that Ford Motor Company had their own deposit, they wouldn't be apt to stick them with too high a price.

So, often you did exploration, but the results were never used. Is that what you're saying?

Well, in this particular case, the results were used, because I found the deposit for them, and they bought the deposit. Therefore, they had it in their back pocket to use anytime they wanted. Oddly enough, to my knowledge, that's the only ore deposit that I ever found all by myself, the glass sand, and it was due to my putting together various information that I obtained from people working in that field, but really, it didn't have much to do with prospecting. It had to do with what you could do with glass sand that was not quite as pure as you would want it to be. I found out from others that it was a very simple operation to wash this particular glass sand that I found, to end up with a very high-grade product, and Ford Motor

Company, to my knowledge, still owns that property.

What years were you with Ford in Michigan?

From 1955 to 1969.

And before you went to Ford in 1955 you mentioned that you did some work with your friend Gerry Hartley here in Nevada.

Yes, Gerry and I worked on several things together. Gerry Hartley was the fellow who I worked with on this prospect up in northern California, and he was also involved with the Otis Kittle exploration. Gerry Hartley and I and Pat Willard worked at a sulfur mine out south of Gardnerville. That was principally mining. I was just a mucker, except that whenever they needed some help on electrical work I came forth with my knowledge. I also did some surveying for them, but, by and large, I was just what they called a mucker.

Pat Willard worked in the plant. Pat Willard, in later years, was the manager for Basic Refractories at Gabbs. Gerry Hartley and I also, by the way, just before the job with the sulfur mine, were involved in surveying with the PWA [Public Works Administration] in Carson Valley.

Tell me about that job.

Well, in order to make work for people, why, the PWA came along. We were trying to extend and improve the triangulation net in order for proper surveys in much of northern Nevada. I particularly was involved around Carson Valley. It was from that job we went to the sulfur mine.

How did the surveying contribute to your knowledge and your skill, because this is road surveying?

No, not road surveying. My work was involved in what they call running levels, in other words, checking elevations between various points in Carson Valley, as well as measuring angles for triangulation in that area. I don't know whatever really became of all of this information—probably nothing—but obviously that helped me in my skill surveying, which was always handy, and it was handy at the sulfur mine, because that made me a more valued employee with the company, and it helped me on various jobs afterwards. The mine needs a surveyor.

Did you work for the Nevada Bureau of Mines?

Yes. After working with Otis Kittle, Jay Carpenter asked me if I wanted to work for the Nevada Bureau of Mines, principally because I had had previous writing experience when working with the U.S. Bureau of Mines, so I worked with the Nevada Bureau of Mines for about five years, and one of the outcomes of that was my work and publication of *Mining Districts in Nye County*, which came out about 1951. Quite proud of that little treatise. It covers all the mining districts in Nye County, whatever I could find out about the ore deposits or the mineral that had been found there. I put together everything I could find on every mining district in Nye County, and that actually is of some value.

When you say you put together everything that you could find, was that archival information, records?

Both archival records and going out in the field and looking over the area and talking to people. A lot of this is just a matter of talking to people about what they remember about a particular deposit. This information is valuable, because it not only takes the place of the exploration geologist going out to talk to people, but it takes the place of an exploration geologist *wishing* he

could talk to these people, because they're now dead.

And so that document has some information pre-1950s of Nye County.

Yes, that's right. It goes back quite a way.

Was it only Nye County that you worked on?

I only worked on Nye County. I started working on Esmeralda County, I believe it was, but about that time I left the Nevada Bureau of Mines to take the job at Ford Motor Company in 1955.

When you were writing about Nye County, what types of mines were you writing about?

Gold—everything. Absolutely anything that I could find about it.

And what kinds of metals were there in Nye County? What were the predominant ones?

Well, principally, it's gold and silver, but there's also mercury, fluorspar. I guess that's about it. It's no different than it is now. Gold is the principal commodity.

So you covered not only what was there, but where it was located.

Where it was located, the best I could describe it. Also, everything I could find on the history of what had been done there previously. It was a very interesting job. I just wish that I had gone into a little bit more detail. Now, as I go back through what I had written, I find it difficult to pinpoint just where some of these properties are, but in those days the maps that we had were not as good as what we have nowadays, so it was not as easy to describe just exactly where a property is.

Mapping has improved tremendously. It started improving about the time that I was with the Nevada Bureau of Mines and through the 1950s; and since then it has continued to improve. The topographic maps we have now are so far superior to what we had in the past, there's no comparison.

Tell me a little more about the Nevada Bureau of Mines when you worked there. Was that a regulatory agency, or what was the purpose of that organization?

The purpose of the Nevada Bureau of Mines was to compile and make available information on Nevada mining and exploration. It's now called the Nevada Bureau of Mines and Geology in the Scrugham Engineering Building on the University of Nevada, Reno campus.

So that's still an information resource, and that's its purpose? Which is different from the Nevada State Department of Minerals and Safety, correct?

No regulation whatsoever. It was just there for information to the public.

When did you start seeing regulations coming into play?

Well, actually, regulations, in one way or another, were always here. We had the Mine Inspector's office, and that more or less died out. After that we had federal regulations coming in. I know very little about federal safety regulations now, because I've had no occasion to be involved.

And the same with environmental regulations? Did you have any involvement in that?

No, I had no involvement. Nobody had any involvement in the environmental regulations. There weren't any. [laughter] I think

a lot of that came about when the mine operators themselves decided that regulations or no regulations, it was a good idea to do things in such a way that it would not infringe on the likes and dislikes of other people, and the first good evidence I saw of this was at the Cortez Mine in Crescent Valley, south of Beowawe.

Was it before you went to work at the Cord Mill?

No, it was after I came back, probably in the late 1970s. I was down in that area on the west side of the valley looking across to the east side and the hills there, and I noticed one hill looked rather odd. It looked as though, for some reason or other, someone had scraped the brush off of it, which to me was very odd, so I went over to Cortez Mine, and we kept seeing this hill and wondering about it. We talked to somebody at the Cortez Mine that showed us around various things they were doing, and I went over to this hill, and I said to the man that was showing us around, "Why did you scrape the brush off this? What's this all about?"

He laughed and said, "Well, that happens to be a waste dump." [laughter] And that was my first experience of what a mining company can do to dress up what's left so that you have the same type of terrain you had before. They had, more or less, contoured or smoothed out this waste dump, and just naturally the sagebrush was growing back, and what I saw was not exactly a barren hill, but a hill with very small brush on it. Therefore, it looked to me as though they had removed the brush, but that wasn't the case at all. Eventually, it was going to look just exactly like all the rest of the terrain around there, and that was a very pleasant experience for me to see what could be done and what companies are doing to dress up what they leave behind.

I appreciated it, although I see nothing wrong with seeing a waste dump just by it-

self being left, but anyway, others do, and as long as other people don't like it there's no great difficulty to smooth out those waste dumps and contour them, so that the slopes are a little bit flatter, and then the brush comes back. Of course, nowadays, they're not waiting for the brush to come back; they actually reseed them, which is a good idea.

It's unfortunate that in the past we have left things the way we did. We'd sink a shaft and walk off and leave it. That's not right, and we have to try to continually think of safety for the people who follow us. I remember in the Upper Peninsula of Michigan we had some of these open shafts around. I always hate to see a shaft filled, because it means that you can no longer get down there to inspect the ground, but on the other hand, it's a pretty dangerous situation to have an open shaft. I've seen some places where the brush was growing around the shaft, so that you couldn't actually determine where the edge of the shaft was—a very dangerous situation. There, as here, we are fencing these shafts, but in the Upper Peninsula they started filling some of them. So I hate to see it happen, but sometimes it's necessary.

You've just gotten back from being out in the field this week. When you go out, from time to time, do you still see some of these open shafts?

They're pretty well fenced now. Everything I see now is fenced. It's fairly safe.

Because there has been a big effort, I understand, by the Department of Minerals and several organizations, or maybe corporations, to try to correct that.

Yes, that's right. The Department of Minerals, or whatever it's called, is actually fencing the ones where the owner is not known, but where the owner is known the people that own the property are fencing them. These are great strides that they're

making. A small mine operator, that doesn't amount to very much, but I recall when I first heard about these plastic pipe posts being used for claim markers, and the comment was made that they kill birds. I just pooh-poohed the idea. I couldn't understand what they were talking about. Well, I had occasion to move some of these posts in northern California, and lo and behold, I found the dead birds at the bottom. The bird, for some reason or other, dives down in there and obviously can't get out, and therefore they do kill birds. That's why the BLM now states that these posts have to be capped or not used. Nowadays, because of change in mining regulations, we can use two-by-two posts to mark our claims. It's no longer necessary to use these plastic pipes, and just as well we don't use them.

Yes. So some of this has been a kind of a learning process along the way. New plastic pipes come out, and they seem like a good idea, but then . . .

Oh, yes. I used them myself, and I just couldn't understand how birds could be killed, but they are.

Did you ever leave an open shaft? I mean, you talked about some of these things. Or were you ever at the end of an operation where that would have happened?

Yes. Well, I recall one shaft we sunk in the Bottle Creek mercury area out of Winnemucca. I think we sunk that down about thirty feet. I don't know what was left, but I have an idea that was left open. I don't think we mentioned anything about that earlier.

On the other hand, I had occasion in the Upper Peninsula of Michigan where, when I first got there, at one very deep shaft one of my jobs was to clean up that particular property. We had a contractor come in and remove the head frame and then cover that

shaft. It was rather large. It had to be covered with steel beams and concrete, so we capped that shaft. Now it's absolutely safe. So here and there, why, I had a little bit to do with both ends of the problem.

Have you had any involvement with the Nevada Mining Association? Are you a member?

Yes, I'm what they call an associate member, I guess, and have been for many years. I don't really know a great deal about the Nevada Mining Association. I know the people in it. Obviously, they try to help the public become more aware of the importance of mining.

What I like particularly about the Nevada Mining Association is they put on these classes for the teachers to teach them a little bit about the importance of mining in Nevada. For about eleven years or so, I've had quite a bit to do with publishing an historic mining calendar. We have cooperated with Nevada Mining Association by making calendars available to these teachers. I think that's a very good idea. I don't know of any place where we can do more good than to help teachers understand something about mining, because, after all, they're coming into contact with the youngsters who should realize what mining is all about, why it is necessary.

Mining education is starting to reach into the grade schools. That's new in the last few years?

Yes, that's very new and a great idea.

When you were back working at the E.L. Cord Mill, was there the same need for public education that there is now?

I don't think there was, because people were more cognizant of the importance of

mining. After all, the kids' fathers probably had something to do with mining, and that's what put the bread on the table. Now life is so diversified that the parents know nothing about mining.

The source of the products is further removed than it was when "your dad" was down underground mining, yes?

That's right. The kid doesn't realize how much is involved in mining when he turns on a light switch.



We wanted to talk a little bit about your friend Gerry Hartley. You've known each other for a number of years. Tell me a little bit about how you met.

Gerry and I were both going to school in 1930 at the University of Nevada. Gerry was staying at the Beta Kappa Fraternity House at 518 University Avenue, and I was living at home with my brother. I had a 1926 Chevy Roadster that I had started overhauling. The summer vacation period was upon us, and I had to put that thing together so I could go off to a job. I was in the backyard putting it together, and Gerry was around. I needed some help, so he gave me a hand with that, and that's about the first time Gerry and I got fairly well acquainted. After I got the car back together again I found out that with the school year over Gerry was going to head back to the Bishop area where his father was operating a small gold mine about thirty-five miles north of Bishop. I, simultaneously, had obtained a job, on paper at least, to go to the B&B Quicksilver property on Montgomery Pass. Well, that property would be en route to where Gerry was going, so I suggested that Gerry come along with me, and I just take him over to his job and then come back to the B&B Quick.

Well, it so happened, when we got to where his dad was working in this little mine, I was intrigued by what was going on. They seemed to think I was acceptable to work there, so I just stayed there, and I never did get to the B&B Quick. All I've ever seen of that property are pictures.

I worked with Gerry then at what was the Lone Star Mine, not only that summer, but for quite a bit of the next year, because I did not go back to school. Gerry was the same as me; he was going to school in mining. We started off by getting prepared to sink the shaft from 300-foot depth to 400-foot depth there, and that required a lot of upkeep and various maintenance jobs around the mine until this could be done. Gerry's dad was more or less looking after this at the time, but he also spent quite a bit of his time away from there, so that left Gerry in charge. Gerry, although being a relatively young man—not even twenty-one, as I recall—had quite a little responsibility, but being as how he had worked so many years with his dad, he was capable of the responsibility. I found I learned a great deal from Gerry. Gerry had experience from the time he was in grammar school, I guess, in the Seven Troughs area and the Searchlight area working for his dad and his grandfather. Gerry has told me about his first work in the Seven Troughs area helping his grandfather. He was just a little kid, and his grandfather explained to him how to hang up the stamps in a stamp mill so that the operation was just coasting instead of actually stamping. It was a rather simple thing, but you can teach the child, I guess, to keep his fingers out of the wrong places and what to do.

You see, the stamps are going up and down, and you have a piece of wood that's like a two-by-four, about eighteen inches to two feet long. When the stamp is up, you jam this wood under part of the stamp column, and that hangs it up so that then the

cam is flowing free, and there's no more dropping after that. For each particular stamp, you had to do it. If, for some reason or another, you want to stop the grinding for a while—you might have to clean up a screen or something—and you want to quit the splashing of the grinding, why, you hang up the stamps.

So its something that has to be done even while the mill is running? You have to stop particular stamps to do some other jobs?

Yes. Most batteries are five stamps, and what the man does is, he hangs up each one of those five stamps, and then he can get down and work on the screen or whatever is necessary, or he may have to work on the plates below the screen.

And you say a battery is five stamps. What does that mean, battery of five stamps?

Well, usually it means that a segment of the stamp mill has five stamps in it, and that is called the battery. Next to it might be another battery, and they would all be operating more or less off the same shaft.

So they don't function independently, each of those batteries? They all function as a whole. You might have five batteries that function as a whole?

Yes, that's correct. They function together. Battery means a group.

So, when he hangs up the battery, that's to clean the screen or whatever.

He might. You see, each battery has its own plate below it and its own screen, and he may have to clean that screen. There's a lot of stray wood gets in with the ore, and wood chips will eventually block the screen,

and that's one reason to stop and hang up the stamps—to clean the screen.

Is that a dangerous thing to do for a young kid?

Yes, it could be, because you could get your fingers in the wrong places there very easily if you aren't careful. On the other hand, it's fairly safe if you just watch what you're doing. These sticks that you hang up the stamps with have a metal handle on them, and it's very simple. They're also hinged. All you have to do is, at the right time, push it in there. He remembered that. Yes, he also told me other interesting things. He was there at the time Seven Troughs had a very serious flood. I don't recall the year now. In regard to the people around there, he mentioned a teacher that came to a one-room school, and she was a little bit hesitant about being alone in that area, and one of the old miners told her one day, "Lady, you're as safe here as you would be in God's hand." [laughter]

How did he mean that? Why would she be safe there?

Because the people were that type.

Would not bother her?

No, absolutely not. No.

Is that true of mining communities in general?

Yes, very definitely, it's true. They all stick together, and their ethics are pretty high, if we come right down to it. They may not be when they go to town, but when they're in camp, they're pretty fine people.

So a teacher, as long as she didn't hang around the bars when the miners were off-duty, she'd probably be fine—is that it?

Yes, she'd be in great shape. In Seven Troughs there certainly were no bars to hang around. [laughter]

So that's interesting, you know, because in most communities today women are not safe.

Yes, that's correct. They have a problem, yes.

But in a mining community, generally speaking, at that time they were safe? Or do you think it still applies today?

I still think it applies to small communities today. People kind of look after themselves, make sure that everything is on the up and up. It's when you get into larger communities you run into problems.

Because there's really a sense of helping each other in small communities? Do you think that's as much a function of small communities as it is of the mining communities in general?

Oh, yes. I don't think it makes any difference whether it's a mining community or whatever. Small communities are very helpful to each other.

Yes. It just happens that most mining is around small communities, but you're touching on the idea that miners in general are fairly ethical people.

Oh, they are. They're definitely ethical, and they may go to town and carouse around, but when they're in camp, why, they're OK—fine, ethical people. All the miners I've picked up from the jungles to go out and work, they're all fine people. In Depression years I ran into some who were quite well-educated, too.

They were simply out of work.

That's right. Difficult to find a job.

Let's go back to your relationship with Gerry. You two obviously really hit it off, and you said you learned a lot from him when you worked together.

Gerry learned from his father and grandfather about mining, and he worked around these small operations, so Gerry ended up being a small mine operator, which is a rare breed and very rapidly dying out. In these small operations everybody had to know or learn how to do things for themselves. You didn't have the opportunity to go down the street and have someone else do the job for you. So I learned a great deal from Gerry that way, and then Gerry and I worked together in so many places.

At the time I had the accident with my eye, I was being taken care of by a small hospital in San Francisco, and Gerry and his dad were living in Oakland, so I stayed with them. When that was finished Gerry and I came back to Reno looking for whatever jobs we could find, and that's when Gerry and I and another Mackay graduate, Pat Willard, and Paul Turner, if I remember right, got a job doing some sampling at the Longstreet Mine, working for a very noted geologist whose name is Albert Burch—well known here in the West. He was just a good, conservative geologist and a mining engineer, if you wished to call him that.

The mine was supposed to have a certain amount of a particular grade of silver ore. We channel-sampled those drifts there, and we learned a lot from Albert Burch about how to properly channel-sample and split samples. It was new to me, and I was very happy to have the opportunity to learn something about good sample techniques.

The rock is hard. You're using a three or four-pound hammer and what we call amoil—it's about an eight-inch piece of drill steel that's sharpened at one end. You actually cut a channel of the hard rock about

four inches wide and maybe three quarters of an inch deep, or something like that, and this mass of material is dropped onto a canvas. Then, after you have your sample, you have a chunk of iron as an anvil, and you manually—with your hammer and the anvil—break every piece of rock down to about a half-inch size. When it's all broken down this way, you roll it on the canvas. By rolling it, I mean you pick up one corner of the canvas and roll the sample to the opposite corner and so forth. You're rolling the sample, mixing it up, and then you drop it on the floor and very carefully separate it into four parts. You save the opposite quarters as your sample and throw the other two quarters away. Then, if you still have too much material, you take what you retained in these opposite quarters and roll that again and take half the sample in the same way.

I see. So you end up getting a more random sample by mixing it all together, maybe kind of an average.

Yes, average sample. There's no tendency for the rock from one part being separate from the rock from another part. It's all mixed up together very carefully. It's a very typical way of sampling. We sometimes refer to it as coning.

It is something like coning and quartering a sample, where you roll the sample into a pile. Then you flatten the pile out, and you divide it into quarters. One quarter would be a sample, and then you work with that and throw the three quarters away. Or you could keep half of it, if you wanted, and throw half of it away. But anyway, by rolling and then making it into one pile and flattening that pile, dividing that pile into quarters and then taking either one or two quarters, you end up by having a pretty good sample of your bulk material.

Are there situations where you would use one method over the other?

They're both so similar. There's no difference. They're considered equally. Nowadays, though, you're very apt to dump this material into a splitter, and that splitter takes out half of it, so it's half of it one way and half of it the other way. It's a mechanical device to do the same thing. The coning and quartering, as we were doing there, is a very old system. Maybe it goes back to Agricola, I don't know. [laughter] [Gnaeus Julius Agricola, A.D. 37-93, Roman general, governor of Britain],

And was the channel sampling a newer method?

No, the channel was very old. The idea is to take a certain measured quantity of the rock off the wall, and by taking a channel, let's say, four inches wide and about three quarters of an inch deep, why, you're doing just that.

You're talking about Gerry being a small-mine operator and that you learned a lot from him. It sounds like a small-mine operator has to know a little bit about everything. Could you describe some examples of that for me—maybe thinking back to some of the things that you learned that summer with Gerry at his dad's mine, the Lone Star Mine?

Well, the small operator has to have safety always in mind, and in this particular case, as I said, we were getting prepared to sink. Then when we were actually in sinking operation you'd have to be so careful that men did not hurt themselves; because, remember, they're in the bottom of the shaft—over 300 feet deep—and the shaft was open up above and then down below. You've got to be careful that nothing drops down that shaft—no pebbles, nothing—because it could be very dangerous. And when you're going down the shaft in the bucket or

on the crosshead above the bucket, you inspect the wall plates, make sure that there are no rocks laying on the wall plates, because these rocks could be dislodged and dropped down on the men who are working down below. All these things are very important.

Of course, you also have the responsibility of keeping the pumps going that are pumping the water out of the bottom of the shaft so that men can work there. It's a very difficult proposition when you're sinking a wet shaft, as you're fighting water all the time, and you're working in water. You've got to try to keep the water in one part of the bottom of the shaft as best you can, so that you can drill without too much difficulty in other parts.

How did you do that in that particular shaft?

Well, with the little bit of muck that's in the bottom, you try to hold the water over to one side of the shaft while you're working on the other side. Best to have the suction from the pump in that lowest part. It's a difficult proposition. You very often have to do so much improvising. I remember so distinctly, when a gear on the hoist gave out one time. We had a welder in our group, and he had to improvise by making new teeth for the gear teeth that were ripped out, and it was very cleverly done, very time consuming, but it was done right on the job.

It isn't the kind of thing where you can run into town and get a new gear?

Absolutely. You're thirty-five miles from town, so it takes quite a while to get there. The town may not have any more facilities than you have.

So it's important to have the ability to fix these.

Yes, and have a few simple tools, so you can drill holes in the gear and so forth.



Vic, you just mentioned that we've covered some terms that we might not know.

Well, I used one word, which is a "cross-head." The shaft cable goes through the crosshead and is bolted below the crosshead. The cable is attached to the bucket below, but the cable is bolted in such a way that the crosshead is held, oh, several feet above the bucket, and the purpose of the crosshead is to keep the bucket right in the shaft without hitting the timbers. Of course, the crosshead is running on the wooden guides on opposite sides of the shaft, so it slides down very accurately in the center of the shaft, and it keeps the bucket right in the center of the shaft, too. When men are going up and down the shaft, they can either ride the bucket or they can ride on the crosshead, and we would ordinarily ride on the crosshead. It was a little simpler that way. As I mentioned, we'd watch the wall plates and make sure that there were no rocks sitting on the wall plates.

And the wall plates are where?

The wall plates are part of the shaft timbers. They are the long timbers. As an example, this is a one-and-a-half compartment shaft, and the wall plates are about eight feet or more in length. They stretch from the five-by-five part of the shaft over to the part of the shaft which has the manway in it, and it was only about two and a half to three feet by five.

So you're saying the "five-by-five" and the "manway." Now these are also new terms to me.

Well, the one-and-a-half compartment shaft, as an example, would be split in two parts. The ore chute is the five-by-five, but right alongside of that is what we call a manway, and that's where the ladders are, and that's where the piping goes down.

You learned a lot. I keep coming back to that, because I'm struck by the fact that Gerry came from a mining family, and he was learning from two previous generations; whereas, you did not have mining in your background, as far as you knew, at that point, so this must have been just wonderful for you.

Oh, yes, I enjoyed it very much, and I was very open to learning anything I could. I soon learned, when you're working around mining—underground operations—you don't fool around.

And for a small-mine operator, the safety is so important, because it's not only his own personal safety, but for everybody that's working for him.

Yes, and there's no medical help right there, either.

What did you do? Were there any injuries there?

No, no, never.

Did you have first aid available? Did somebody know about first aid?

Oh, yes. We all knew something about first aid—not very much. No, not much was said about first aid. Just be careful, that's all.

On that project there were no problems. You didn't run into any injuries or any problems?

We had no problems, whatsoever.

So, looking out for the safety really worked there?

Yes. There were plenty of opportunities for problems though. We had engines that were supplying power to compressors and generators and all run by flat belts. These belts can be treacherous, too. If an engine stopped you had a method of turning the flywheel of the engine backwards against compression and igniting the chamber to try to start the engine, and it was tricky. They had a potential for danger.

What other things do you remember specifically—incidents, lessons—that you learned there at the Lone Star Mine.

Well, I recall that we used distillate for a fuel for the engines. Distillate is kind of a cross between kerosene and gasoline. The top man looked after the equipment while the men were underground. There's a hoist man working in the hoist by himself, but there's a top man who's looking after the equipment and also helps the hoist man when necessary around the shaft. The so-called top man is also fueling the equipment as it's operating. Every so often, we would take a five-gallon can and set it near our large tank of distillate and open the spigot to fill the five-gallon can. While that was filling, we'd be doing something else. Every once in a while, we'd forget about the distillate running into the can, and then we'd have a flood of this distillate all over the ground around there. Although distillate does not evaporate as readily as gasoline, and it's not as dangerous, still, it will burn. Several times we'd have a flood of this distillate on the ground there when the top man forgot all about it. That was a little incident that always bothered me, that I had a part in that dangerous stuff being all over the ground like that. The stuff will not ignite like gasoline

does, but it's bad enough. I know it doesn't ignite as well as gasoline, because my little Chevy Roadster that I had there at the camp, why, in lieu of gasoline, I would put some distillate in the gas tank, but always mixed it with gasoline. A 50/50 mix wasn't too bad, but when you started putting much more distillate in you had trouble. The automobile doesn't operate properly. [laughter]

From the mine that Gerry's dad owned outside of Bishop, where did you and Gerry go from there?

I finally went back to school. I believe Gerry went on to other jobs, and I don't know where they were.

What happened to that mine? Was there nothing there?

It eventually just sat there, and nothing ever happened. It took a lot of money, which we couldn't raise, to keep that going, and there was not enough ore there to warrant anything being done, although we did take out a little bit of ore, which I understand was later milled by a small mill placed on the property.

Who was in charge of raising money? Was it Gerry or his dad?

Gerry's father. He was pretty good at that. He had quite a few contacts back in New York. He raised a little money. It wasn't long after that, I guess, Gerry and I and Pat Willard worked on some survey crews under what was called the PWA, one of the alphabetical organizations set up to make work for people, and we did a lot of surveying in Carson Valley. Then the Leviathan Sulfur Mine opened up, and they were producing sulfur out of the ore there and shipping it to wherever. I think the market for sulfur was pretty good at that time. The three of us went out there and got jobs. Pat

Willard was the only graduate. Gerry and I were just miners and muckers. Oddly enough, Pat Willard, who was working in the sulfur plant—I guess they weren't quite satisfied with his maintenance of the equipment or something. Anyway, he got fired, and Gerry and I were just about ready to leave, too, but the management talked us out of it, so we stayed a little bit longer. Pat Willard later went to Gabbs and, eventually, was the manager of Basic Refractories at Gabbs.

You talked about the market for sulfur being good. The market played a big role in where you could find jobs, is that correct?

Yes, very definitely. In later years, why, it was a good tungsten market that made an opportunity for us to work in tungsten. That was after World War II.

So tungsten was a strong material then, and sulfur was before the war?

Oh, yes, that was before the war. I think it was used largely for agricultural purposes. Before I ever worked at the Leviathan Sulfur Mine, I often saw a bin at Minden that had raw sulfur in it. I knew it was sulfur, but I didn't know where it came from, or where it was going for that matter. It was later that I worked at the source of this sulfur.

So you did some sulfur mining together with Gerry, and then, what was your next adventure with him?

Although Gerry and I worked on quite a few jobs together, quite a bit of the time he was in one part of the country, and I was in another part of the country working on different jobs. After Leviathan Sulfur I got a job at the Silverado Mine south of Wellington in the mill. It was a cyanide process mill handling silver ore from nearby Silverado Mine. Gerry was not on that job, at all. It

was on that particular job that I gained my first experience in cyanide milling.

Let's talk about the tungsten. Did you work with Gerry in tungsten mining after the war?

Yes, it was after the war. A fellow that I went to school with, Otis Kittle, had a little income from iron mine royalties in Minnesota, and he thought it might be a good idea to set up a little exploration company, which we did—Gerry Hartley and John Wells and I. A geologist named Stevenson was also involved.

We first looked for more mercury in the Bottle Creek district out of Winnemucca. We weren't successful at that, but then John Wells and I kept looking for other places where we might be successful. One place where we spent quite a bit of effort was a little lead-zinc property near the junction of U.S. 395 with the road that goes to Wellington, about fifteen miles south of Gardnerville. We found a little more ore, but it really wasn't worthwhile.

About that time Gerry joined our group, and we looked into tungsten near Bishop. The tungsten price was good then. We knew the owners of a small tungsten mine that was lying dormant near Bishop, and we went out there and were able to mine some tungsten. We also rented a small mill there and concentrated it, as well, and sold the tungsten concentrate. Gerry looked after that mill and the cleaning of the concentrates, principally. Did a very good job at it.

So he was kind of in charge again.

Well, he was in charge of the mill, very definitely. He and I together figured out what to do at the mine, but Gerry was the best head, so far as the mining was concerned, too. Simultaneously, we were able to purchase an underground diamond drill, and we used that on the tungsten mine to try to

find an extension of the ore, but we didn't do very much good with it. We found more ore just by following what we knew was there. The diamond drill didn't help us at all, because we just didn't drill in the right places.

You said you started an exploration company. Was this part of that?

It was part of the same exploration company. At this particular time we were concentrating on the tungsten. We couldn't find anything else, and the tungsten price was good, so we stuck to that.

So were Otis and John there with you and Gerry?

No, Otis was never on the job. I think he was in San Francisco at that time. He was funding the project.

And then, did you hire some people to work there?

Yes, at the mill Gerry hired a young man who had experience with that particular mill, and he and Gerry together ran the mill.

I see. And you and John did more of the work on the mine, with Gerry's help.

Yes, that's right.

So it was really a small operation.

Very, very small.

Did you end up making any money on that project?

I don't think we made any money. If we made enough to get some of the money back that had been spent we were lucky. In the overall picture, we didn't make any money on anything, not on those ventures.

Really? So what did you do for a living wage then?

Well, the arrangement was that Otis Kittle would put up the money for us to get by on, and that's all it amounted to. That would take care of bread and butter, you might say, for us to live.

The old grubstake idea, basically?

Yes, that's all. Our arrangement there was to get a little bit per month, and then if we found anything, why, that would be another situation. That did not develop at all.

With this particular exploration company, what happened after the tungsten mine? Did this group stay together? Did you continue?

No, that was the end of it.

Was that your only experience with tungsten mining?

Yes, that was my only experience. Gerry had a long experience in tungsten, mining and milling over these years. He was a kid around World War I—well, shortly after World War I. As a kid, as a very young man, he worked at a large tungsten mine out of Bishop, referred to as the Pine Creek Tungsten.

I mentioned Norman Annett. Oddly, Norman Annett was going to school at the time, and he was at the Lone Star Mine for just the summer, but he was working both as a mechanic and a welder, as well as one of the hoist men there. Actually, he was putting in a double shift every day. His idea was that whatever money he could make would make it easier for him in school the next year.

While Norman was going to school at the Mackay School of Mines, his wife was working in a jewelry store in Reno. Any money

that Norman could earn during the summer was very important to him. Therefore, his working a double shift at the Lone Star Mine was rather rough, and you have to give him a lot of credit for doing it. He worked one shift as hoist man and another shift when necessary to do welding and various mechanical work. He was the one that very cleverly designed, or figured out how to repair gears when the teeth had been ripped out. He drilled holes into the remains of the gear and screwed bolts into that to act as part of the teeth. Then he would build the bolt up with a welding torch to make the teeth. After that, he'd have to grind the excess out. Anyway, it was very time consuming, but we had no other source of replacement. Just an example of how you'd have to have considerable innovation sometimes out in a small mine. People could imagine how to do some of these things.

Right, and some independence, not thinking that somebody's going to come to help you, but how can I fix this myself?

Oh, yes. It reminds me of a first-aid course I took when I was in Michigan during the time of various bomb scares and so forth. This course was designed to teach you not what to do before the doctor got there, as you do in first aid, but what to do when you knew the doctor was not coming. [laughter] This sort of makes me think about that. They fit together very well. No doctor, no mechanic was going to come! [laughter]

You guys were on your own out there. Do you think that's still true today? Is that so much a factor today as it was in the 1930s when you were working on those?

Oh, today you have so many facilities around to use. You can usually take equipment to somebody that can handle it. You have all kinds of shops around.

So the repair work is still done rather than reordering pieces, but there are various places to take it. Transportation is easier.

Yes. Well, now you have the ability of reordering and getting it by plane quickly or having a shop that can make it over.

Within driving distance, probably.

Yes, that's right. Oddly enough, very few people know this nowadays, but the V&T shops in Carson City were extremely important to the mineral industry in Nevada and eastern California because of the facilities they had there to make various things.

To make some of these parts?

Yes, that's right. And I remember that, somehow or other, someone had to have a crankshaft rebuilt or re-babbitted or something like that. That's the place where you would go—the V&T shops in Carson City. I never did. I knew about it and talked to the people that made use of that all the time.

I was wondering about a term you used, "re-babbitted."

Re-babbitted means replacing the bab-bitt that has been destroyed in one way or another in a bearing. That bab-bitt is molten metal which is poured into the bearing. In other words, the bearing has to be set on the crankshaft first, properly, and then just pour the molten metal in there for the re-babbitting process. It was very common for the V&T to do that. They had good-sized lathes, so they could make equipment when necessary. They were wonderful facilities for this part of Nevada, particularly. Of course, you had facilities something like that at Kennecott Copper out of Ely. That's in the extreme eastern part of the state.

Were there other things that you remember from those early experiences with Gerry as the small-mine operator? It sounds like he was in many ways a teacher to you.

Yes, he was. Of course, I had known Norman Annett before that time and knew him until the time of his death in the last few years. Norman continued to be the type of person that could, by himself, do many things that were necessary. After all, he set up the Twin Lakes Resort area out of Bridgeport and all of the various things that had to be done with that, including sewage treatment. He was trained as a mining engineer. He was a member of my original class; I stayed out of school too much, but he graduated from Mackay School of Mines in 1932.

Yes, so he and Gerry were both people that you kept in touch with over the years?

Oh, yes, I did. Been in close touch.

You've had some really important friends in the mining industry: Gerry, Norman. You've talked about Pat Willard several times.

Yes. In later years Pat Willard was manager of the Basic Refractories installation at Gabbs, and then he contracted some kind of a nervous disease, which eventually completely incapacitated him. His wife, Clara, who was from Maine, took him back to Maine, and that's where he died. When Juana, my first wife, and I were in Maine from 1972 to 1975 we contacted and met with his widow, Clara Willard, several times. I was in Maine working for Hanna Mining Company as a landman, obtaining leases for land for the mining company.

It sounds as though—and this is not unusual today—there are a group of friends that you've made through mining that eventually became scattered all over the country,

going to various jobs, but you've all stayed in touch. Important friendships.

Yes. Or in some cases we lost touch, but picked them up again. This might be off the subject, but in about 1936 or 1937 there were two women graduated in mining engineering. One was Betty Bowman, and the other one was Jean Horning. They are both mentioned and pictured in the 1997 Historic Mining Calendar. I just put Betty Bowman on the plane the other day to go back to Los Angeles. She was up here for her sixtieth reunion since graduation from the Mackay School of Mines.

Did she continue in her work in mining?

She did for a while but not very long. She worked in Alaska for a while on property, and I don't know just exactly where she worked. Keep in mind, she was way ahead of her time as far as being in mining. You have all kinds of women in mining now. At the time she was finishing school here, I was working for the state highway department, but living here and having contact with the school quite a bit, why, I met her. I remember talking to her one time, and she said, "You know, I sometimes wonder if I'm a square peg in a round hole." I always remembered that. Women were just not into mining.

Right. Were those the only two that you encountered during your early years?

Yes, there were no others.

It was much later before women really came into mining courses. How was it for them in school? What was the reaction to them?

This is a very interesting question, and I've thought about it a lot. I remember so distinctly a couple of fellows talking about Betty Bowman. She was a very good student

in school, always had good grades, and she knew what she was doing all the time. One of the fellows said something about, "How would you like to be in the mining industry married to a girl like Betty Bowman?"

One or the other of them said, "How would you like to be married to someone that knew your business better than you did?" And that always stuck to my craw, being the most idiotic, chauvinistic statement that I'd ever heard.

You mean, at the time, that's how you felt?

Yes. It shouldn't exist at all. It was stupid. I've mentioned that to other men since then, and most of them are wise enough to say, "I think it would be a good idea." The idea would be a tremendous help to them. The attitude wasn't there.

Your attitude was probably unusual, would you say?

It probably was. Of course, I was a little bit older than some of these students, too, at that particular time, but I thought it was stupid. Betty Bowman went on to marry a businessman, although she kept her interest in mining, and she still is interested in mining. I send her articles once in a while about mining, and she asks me about others. She was not involved with the mineral industry after that.

What about Jean Horning? Did you keep in touch with her?

Well, Jean Horning, I believe she was on the editorial staff or worked with one of the mining magazines for a while, and then she did something else in the mineral industry, but she is now deceased.

So they would have been some of the early pioneers as women in mining.

They definitely were pioneers.

And when Betty said that to you, about being a square peg in a round hole, do you know what made her say that? Was she having a hard time in some way, or did she not see what her future was going to be?

She was smart enough to realize what was going on around her, and she just couldn't figure out how she was going to fit into the industry when she got out of school. It was largely due to the help of Frank Hunt, who was quite a benefactor to the Mackay School of Mines, that she was able to work in the mineral industry after she got out of school. He helped her. It was some kind of a connection with property in Alaska, whereby she was able to work on this property. In the last few days, because Betty Bowman was here, I could think about this. I was thinking of another instance. There was a girl (I don't remember her name, and it doesn't make any difference) who graduated from Michigan Tech, a very good student, and there was a problem with her. Where ordinarily men would go out to a camp in the field and work out of that camp, in her particular case, they had to ferry her back and forth in a helicopter to the job. So it wasn't until more recent years, say, the last ten or fifteen years, that women had a place in the field. It was difficult for her.

So prior to about the last ten or fifteen years, did you personally work with women in the mining industry?

Yes, I worked with one at VEK Associates in the work we did out of Battle Mountain. We hired a few people, and one of them was a woman, and she did a tremendous job.

What did you hire her to do?

Sampling.

Was she a mining engineer? Was she a geologist?

I think she had a degree in geology. She was a wonderful person to work with, and she really held up her part of the job. There's always a lot of office work to be done that we all do, and she was exceptional in that.

But prior to that, you hadn't had any occasion in all the years to work with women?

I had no occasion to work with a woman.

Have you talked to people about women in mining recently? What would you say the attitude is now compared to that comment about being married to someone who knew more than you did, back in the 1930s?

I don't think anybody even thinks about anything like that now.

It's an interesting topic, because in talking to some other folks around Silver Peak, they talked about the belief that it was unlucky for a woman to be in underground mines. Had you heard that superstition?

Yes. That was a very old idea. I wouldn't be a bit surprised if it wasn't imported from other countries. I think it came up from South America or Mexico. Somewhere or other I've heard that superstition mentioned about miners, that they are really worried about women underground.

Did your wife ever go underground to visit you at any of the mines?

Yes, I guess in some of the properties. Not a working mine, but at some prospects, yes, my wife went underground with me. Anyway, I remember one particular property with quite a long tunnel. We went in with carbide lights, and all of a sudden my

wife started getting a headache, and I realized what was happening. She was getting low on oxygen. Those of us who had used carbide lights realized that if carbide lights start giving too much trouble, we were being forewarned that we were running low on oxygen. There's too much carbon dioxide and not enough oxygen. In all underground workings, anything that's rotting is consuming oxygen. Therefore, you go in there, and you're short of oxygen, and that is particularly true in a long tunnel. You still have to get back out.

Right, so then your wife's headache was a signal.

Yes, it was a signal to get out. Nowadays, they carry little canisters. I forget what they're called, but they're a safety device to give you temporary oxygen.

I was going to ask you another question about women as prospectors. There were some women doing prospecting around Nevada throughout the years. Did you ever meet any of them?

Josie Pearl.

We have a copy of A Mine of Her Own by Sally Zanjani, and in there is a picture of Josie Pearl. Vic, you said that's exactly how you remember her.

That looks like Josie the way I knew her about 1930. I met her in the Leonard Creek area. I think it's called Bartlett Creek, actually, near the Leonard Creek Ranch. Norman Annett, his brother Seryl, and I were up there sinking a winze on a pretty fair showing of gold ore in an old prospect. Josie Pearl owned some nearby claims, and she was living up there, and Norman had told me some stories that I doubt now. I'm not sure whether it's true or not, but he said Josie

had been a madam in the Bodie area years ago. Well, keep in mind that here I am—eighteen, nineteen-year-old kid and not very smart, I guess—but Josie kind of half scared me.

One day she showed me a rock. It was a very soft material, and it had what she claimed was gold. I thought to myself, “I’ll bet these are brass filings all over the surface of it.” I looked at it kind of curiously.

She said, “Why don’t you break it open.”

It was a soft material, and I broke it open, and the same stuff was on the inside which was on the outside, so obviously it was gold. I was astounded. That was a very fine specimen. She knew what she was doing very well. Later on she was a cook at the Montero Ranch at Leonard Creek, which is referred to as Leonard Creek Ranch.

And you were working in that area?

Yes, it was in Bartlett Creek. We pitched a tent there. We were there exactly thirty days, I remember, sinking a winze, and it petered out. At the adit level it was, maybe, eighteen inches wide. At about thirty feet it pinched down to nothing, so we had to chalk that up to experience.

What was your impression when you met Josie? You said you were a little afraid of her. Anything else that you remember? You were young.

Well, my impression was that she was a pretty tough character.

Because why?

I don’t know. I guess from what I heard and from just talking with her. She was not a sweet, old lady. [laughter] She was factual and down to earth and was not a nice, little, feminine character by any means.

Was she gruff?

Well, not necessarily so, but the circumstances were a little bit odd, because we were leasing ground from a fellow that didn’t like her, and she didn’t like him, so there was a little conflict there. The ground was being leased from a guy named Guy Bishop, another old character there. It may be that some of the claims—she thought they were hers, and he thought they were his, I don’t know. This happens very frequently in situations where probably neither party was doing the assessment work. There was a little tension, but as I look back, I think Josie Pearl was OK.

Were you amazed at the time to find a woman out there? Was that surprising to you?

At the time, yes. It was a few years after that, in some of the work I did, I ran into women quite frequently out in the hills—not necessarily prospecting. They were on ranches. Usually, these women knew their way around and were very helpful. Later I got acquainted with a well-known lady in the Indian history of the state, Peggy Wheat. Her original name was Peggy Hatton, when I first knew her, and she was very much interested in prospecting.

Did she do prospecting on her own?

I don’t think so. She was interested, but she didn’t have much time to do it. For one thing, she had about three children. They were small, and she had her hands full. Later on, she was involved in writing about the Indians in Nevada.



Vic, you had some things to say about safety and mining practices.

Yes, we had gone into a little detail about the safety regulations and changes in safety

and mining, and it occurred to me that one practice of the earlier days was the use of what we called safety fuse. It was used considerably in the explosive industry. When the miners had drilled a round and loaded it, each hole would have a length of safety fuse attached to it, and they lit these in a certain order.

There was always the danger that a miner would be careless about the timing, and, therefore, he could be caught in a blast that would go off while he was still lighting the fuse. This happened to a friend of mine who was killed in Idaho or Oregon a few years ago. Miners sometimes have a certain contempt for the safety of the fuse, and they think they can determine the timing pretty well in their mind. It's a very dangerous proposition—lighting fuse and not realizing just how fast time is moving along. Safety fuse burns at roughly a foot per minute, and usually fuse is cut in about six-foot lengths, something like that. That gives the man about six minutes to get the round lit and get out.

There are various ways that miners time themselves. They might have a blank piece of fuse that they light. They start lighting the round, which, say, is five feet long; and when that completely burns itself out, they realize they've got to move *immediately*. They have no more time. That was one of the things miners did, but by and large, it wasn't always so safe, therefore the use of safety fuse has now been outlawed, and I think properly so. Nowadays, you have to use an electric device to explode the charge, and although it's a little bit more difficult for the small miner, because it is an added expense, I think it's well worthwhile.

When you say safety fuse, is that the name of all of this fuse, or is that the name of that five-foot length?

No, that is the name of that particular type of fuse. Fact is, all that type of fuse is

called safety fuse. Some of it is white; some of it is black. The black is more waterproof than the white, but it is all somewhat waterproof.

So, you lost at least one friend by an error, just losing track of time as they're getting ready to light the fuse.

I know one that's been killed that way, too. They just didn't realize how extremely dangerous this is.

That's interesting, to say they didn't realize how dangerous it is, when that's common knowledge. Mining is dangerous, and especially the blasting, and so it's curious to hear you say they just didn't realize.

Maybe, instead of saying they didn't realize, one should say that they had a certain contempt and thought that they could overcome anything. This is very common among men, from the time they are kids until they die. They think they're immortal.

So, they make it through a number of blasts, and then they get to the point where they just think they can't get hurt?

They think it's a very simple operation, and it isn't really so simple. The first thing you know, a man has a little trouble lighting a particular fuse, and it takes him extra time. He's fumbling around with that, and time goes by, and he's in real danger.

Is there anything else on safety practices—changes that you've seen over the years?

This one item came to mind because it happened in the past few years. In a way of speaking, outlawing safety fuse is a hindrance to my work in prospecting and working around a mine, because very often I'll want to shoot some boulders or something like that, and only a few shots with

hardly any danger involved. I would much rather do it that way than fool around with the electric blasting devices, but when you look at the overall picture, I can see the advantage of the electrical system.

And when you say you'd rather use the fuse than fool around with electrical blasting devices, is it because they're time consuming, expensive?

The fuse is so simple. Say, you have one or two shots you want to make, boulders that you're trying to blast. You just split the fuse and light it and walk away. It's a lot different than shooting a round in a mine where you have anywhere from ten to possibly twenty holes to light.

Do you have one of these electrical blasting devices? Do you use them when you're prospecting, or you just don't blast?

Nowadays, I don't have any occasion to blast anymore. When I have had occasion in the last few years, I have used the electrical blasting. Usually, we have a battery around somewhere to set off the charge. Very simple.



You mentioned that when you were growing up your mother had some knowledge about labor unions, and so you had experience on that.

My mother was very sympathetic to labor unions, and as I read various items about labor activities, I could realize why she was sympathetic, too, because there was a time when labor unions were more or less ostracized, and men lost their lives. They lost their liberty because of their beliefs in labor unions. So I was always rather sympathetic to my mother's ideas on this, and I saw some pretty horrid things in re-

gard to labor strife. My father was a tailor, as was my mother, and the two worked together at home tailoring. They would work for a larger tailoring company, wherein they would do their part of the work at home. It was piecework. I remember, oddly enough, that the principal thing that they did was to make vests. Nowadays, people don't think a great deal of vests, but years back, a suit was not complete without a vest. They brought the materials home from the shop where it had been cut and marked, and then they completed making the vest. I remember very often my obligation—when nobody else was available—was to deliver this to downtown Los Angeles. I was in my early teens.

So you delivered them to the main tailor. In doing the piecework, were your parents in a union?

Oh, no. They were not involved that way at all in unions. They belonged to, I suppose, various general unions, but by that I mean union-conscious groups; they were not involved in unions as we know unions today. They were definitely union supporters.

You said you saw some situations that were not very pleasant. Can you give me an example?

Yes. I recall a situation in Long Beach—this would be seventy years ago—where the police were trying to break up an assembly of various union-sympathetic families. I saw pictures where the police, in order to break up the assembly, had thrown boiling water on children. This seems odd. It seems unbelievable, but it did happen. In the frenzy of one group against another, a mob spirit takes over, and people do some very peculiar things. I remember that very well. I remember seeing the pictures and hearing about the whole thing.

You saw these pictures. Were they in the newspaper or something?

No, they were actually photographs that people who were there had the opportunity to take. They reproduced these pictures, and I got a set of them. My parents were not involved. They got this information later from people that were definitely involved. Most of my information on this has come from reading.

But as a youngster, were you afraid for your parents, knowing this kind of thing?

Well, no, I was not particularly afraid. Except my father had a very bad habit sometimes of talking when he should be listening. I remember in World War I when there was a terrific craze against the German people. We went all out to do some very silly things, such as street names were changed from a German name to something else. My father was not German by any means. He was Bohemian. I would not say that he was a German sympathizer. He definitely was not, but he didn't like all this hullabaloo against the German people. He made some remarks, I remember, when I was a little kid, that could have led him into trouble. The only reason he did not get into trouble is that he was in the process of taking out his citizenship papers; and, therefore, that would indicate that his heart was in the right place. But anyway, because of this, I was somewhat concerned about my parents. My mother was very logical about all these things, and she was a union sympathizer, but she used good judgment all the way along.

What impact would you say it had on you to be raised in a family where they were sympathetic to unions? Did you end up with the same viewpoint as your parents?

I ended up with the idea that you have to take a broad view of all this, and you have to look at the labor side as well as the operational side, and, therefore, I'm looking at the picture from the outside. Although I am somewhat sympathetic toward union activities, I also realize that they can also go overboard, and I've seen this. I don't think it's right for a union to try to force membership on an employee. That is obviously contrary to what most union people believe in, but I think one has to look at both sides of the picture all of the time. It's not fair to either side to say one is right and the other is wrong.

Did you come in contact with any union activity in your years working in mining, either in Nevada or when you were working for Ford in Michigan?

No, I ran into no union activity whatsoever. There was nothing. I was always involved in very small groups, and I didn't come in contact with any union back there, but from my past I knew something about it. As an example, many people in this state probably think the IWW [Industrial Workers of the World] was a hindrance to activities in Nevada, but I think the IWW is no different than any other union organization. They're possibly a little bit more radical, but they tried to further the interest of the laboring man. I could see nothing wrong with what they did.

So, even though you didn't personally come in contact with the union, you were aware of union activities around the state?

There's been very little union activity. All the union activity I know of in the state happened a long time before I got here. It's what I read about.

For example, Goldfield and so on, was much earlier.

That's right. In Goldfield, the governor calling out the National Guard and all that stuff that involved the IWW. In case somebody wants to know, IWW stands for "Industrial Workers of the World," not, "I won't work." [laughter]



You mentioned that you did some work surveying dam sites in Nevada. Tell me about that.

About 1935 I was able to get a job with a small survey crew that was part of the U.S. Geological Survey, in which we were surveying potential dam sites in this part of Nevada. I recall we started in Paradise Valley and did some work along the Little Humboldt River. Then later we worked on the Carson River. That's about all I can say about it, except that I don't believe any of these dam sites were ever developed.

You did locate some potentially good sites and made some recommendations on them, is that right?

We just made up the maps and left the rest to somebody else. I worked for Fred Roumage, who was a graduate of the Mackay School of Mines, on that particular job.

When you say that they were never developed, since it's 1935, was this part of the extra work that was provided during the Depression years, or was it a project that just kind of dead-ended in some way?

I really don't know. It was not part of the "make work" idea of those days. It could eventually mean something to the state. Why nothing happened, I don't know.

Your eyes lit up when you started to talk about that, though. Was it something that you enjoyed doing?

It's interesting. I enjoyed the work very much. Of course, I like the outdoors. I learned something from the people I worked with. I greatly admired Fred Roumage, because he was a very tough individual that could work hard and get things accomplished. I learned a little bit about surveying in general and what could be done in that type of work. This was plane table surveying, which isn't used much today. That was my first experience with the use of plane table instruments. Later on, I did quite a bit of plane table surveying. When you come right down to it, there aren't a lot of people that understand plane table surveying. You have a table out in the field, which is set up level on a tripod, and you make a map as you do your surveying. You're making a map right on that sheet of paper on the table. The instrument you use is called an alidade; it is used in conjunction with stadia methods, whereby you observe and measure your foresights with the alidade and plot this information on the map, so you develop your map right there, as opposed to taking notes and then using these notes to plot your result. Later on, in my work with the Nevada Bureau of Mines, in conjunction with the U.S. Geological Survey, we studied iron deposits of northern Nevada. In this work, we mapped several iron deposits using the plane table method around Lovelock and also out of Jungo, which is along the Western Pacific Railroad west of Winnemucca. We found the iron deposits, then actually mapped them to indicate the extent of the iron ore.

Was surveying something that you also learned in college?

I started learning it in college, but most of it I learned as on-the-job-experience. In-

cidentally, my surveying knowledge helped me a great deal in later life and frequently provided jobs. Surveying was very often handy for me to provide jobs locating or surveying mining claims. It meant a lot to me. Also, I was always interested in it. I liked it. I've been a registered land surveyor for quite a number of years.

What's required to be a registered land surveyor?

You have to have the experience. In my particular case, I had the experience, and the people knew that I had experience, so I was grandfathered into this. However, later, while doing some work for Homestake Mining Company, I had occasion to try to retrace a county line in northern California, and I found from the Engineering Registration Department in California that my grandfathered registration in Nevada meant nothing whatsoever to them. I had to take an examination. So I took the land surveyor's examination in Nevada, which, due to reciprocity, gave me an opportunity to also use that certification in California. I recall that when I took this examination I was about sixty-five, and let me tell you, for a man of sixty-five, taking an examination of that type, which is really slanted toward young people, was pretty rough, but I made it. [laughter]

It's more designed for students just coming out of college or something, instead of people who have been out working for a lot of years?

Yes, that's right, for people that have not been out of college very long. I studied a lot for that examination.



You've shared with me this University of Nevada bulletin that you wrote on mineral

resources of Nye County, Nevada. I'd be interested in talking about this a little bit, because I'd like to ask you some questions about how you came about doing this, what was involved in it, and so on. You did this in what year, 1951?

Yes, I think it was completed in 1951. I was working for Nevada Bureau of Mines, now the Nevada Bureau of Mines and Geology, which is actually part of the university.

Is that unusual for a bureau of mines to be part of the university?

It happens in other states. They're tied together. I'm quite sure in Arizona they tie in. I don't know about California. California may be an entirely separate group.

Jay Carpenter was the director of Nevada Bureau of Mines. He was also the director of the Mackay School of Mines. That was before it became a deanship. This work on the counties did not start with me. I believe it started with a bulletin on Washoe, Storey, and Ormsby County written by Ted Overton. Jay Carpenter had the idea that he'd like to do this for many of the counties, so he started me out on Nye County. I was kind of lucky that Jay realized my abilities through writing that I had done for the U.S. Bureau of Mines. I had done exploration on some iron ore deposits, also a fluorite deposit, for the U.S. Bureau of Mines, and I wrote the necessary reports of investigation that tied into the study.

Tell me what process you went through to gather the information and write this. You said specifically to me that you followed a different angle on this than some others.

My principal interest in writing that resource book on Nye County was to gather all the historic information I could, like the names of people, and to talk to people that were involved, so that this record might be

of help to others later on in studying certain mining districts. I frankly think I did a pretty good job. My objective was not to detail geology or anything like that. It was to get a general idea of what was found in that district, and how it occurred, and who did it, so that others later on could benefit by my study.

And you also covered in there a lot of detail about the amount of money that was made in some cases.

Oh, yes. I covered production records as best I could. Just everything I could find out about each mining district in Nye County.

Were you in charge of doing the research for this, too, or was the research readily available to you through Bureau of Mines records?

I did the research myself and, yes, I went through everything—all the literature that I could find on these districts—as I went along. Of course, one of the important parts of my research was talking to people, because what information I could get from them and put on paper was going to be valuable later on, because sooner or later they'd be gone.

So the conversations that you had with people complemented the documents and records?

Oh, very definitely. They complemented everything very well, and they were in addition to what was written in the literature by, for example, Geological Survey geologists.

Did you do a lot of travel to do the research on this? Did you actually go out to Nye County?

I went out into all these mining districts. Oh, yes, I visited the whole area.

Did you have any conclusions when you came to the end of this project? I mean, an overview of Nye County or a perspective that you could sum up?

My general feeling was that there were still areas that were well worth investigating. They still had some potential. My only regret was that the topographic mapping at the time I did this work was not as good as it is today. I think I should have gone to a little bit more effort to pinpoint where some of these deposits were. A description of some of the areas there are too general, in fact. I should have gone to more effort to state just exactly where these places were.

It seems to me like you must have known Nye County backwards and forward by the time that you were done with this.

I knew no more about Nye County when I started than I would of Humboldt, Elko, or other counties. I guess I knew a little bit more about Nye County, because, during the war years, I examined mining prospects for the War Department.

Have you followed Nye County production since you wrote the bulletin? Do you keep track of it at all?

Oh, yes. I've watched what's going on. When I talk about Nye County, I'm particularly intrigued with the Round Mountain area, because that was moving ahead when I was there. They used a very novel way of mining and washing gravel there, but later it became very important from the standpoint of hard rock mining. There was nothing unusual about the washing method, but what was novel was their mining method.

They had a way of scraping the gravel from the side of a pit with a large scraper, which was pulled up and down with a large drag-line boom. I had never seen it used before or after. Ordinarily, you'd think they would just go down in lifts off the benches and actually mine it with shovels, but in this particular case they found out it was very much cheaper to actually scrape it, as long as the gravel was loose enough to allow the scraping. There's a pretty good picture of the device in the Nye County bulletin.

So was it just the formation in this particular pit that made this a novel method?

Yes, it was a semi-consolidated gravel, but it was loose enough so that it could be scraped.

So it was an example of, would you say, an innovation based on what was there to work with?

That's correct. The people, the operators, were smart enough to realize that this would be a much cheaper way of mining that gravel, of detaching it from the wall itself. Cheaper than using a very expensive shovel to move it.

Do you know who was responsible? What company was working there at that time, do you know? Or who the person might have been who designed that?

I don't know anything about the people involved. Unless I put it in a bulletin, I wouldn't know. I did watch the news on the area. It's moved along very well. There's a terrific amount of history on the Round Mountain area, which is only briefly mentioned in my book. I don't know just where it started, but Lou Gordon, who was for many years the secretary or director of the Nevada Mining Association, lived at Round

Mountain. He moved that along as best he could for many years.

That was kind of his pet project, was it?

Oh, yes, that's what kept him going. As far as general history, there's very little I can tell you about it, except it goes back a long ways. At first they were mining small stringers that paid off pretty well, but later on they found out that bulk mining paid off better.

And when you were looking at it in 1950, 1951, was it the bulk mining then at that point?

No. You see, what I mentioned about following small stringers and so forth, that's lode mining. In other words, that's mining rock in place, but when I was there, they were mining the placer ground adjacent to the lode deposits. They were mining the material that was washed away from the lode deposits that were hundreds of feet, probably, above the present surface. They were doing very little with the lode mining at that time.

I scanned through this publication, and it's very well written, and it seems very comprehensive to me.

Thank you.

I think it's definitely a work to be proud of. All of the counties were not finished. Is that correct?

Oh, no. I don't think that anything was done by the Nevada Bureau of Mines on counties after this one. There's more of a tendency now to write on the geology of districts, or the geology of a particular county. I went more into the history.

Well, that's interesting to me, based on the project we're working on, which is Nevada mining history through oral history interviews. And what you're saying is that there's a lot of documentation of products and so on, but some of the history has not been documented, then, as well as it could be.

I don't think it was. I don't really like the way the U.S. Geological Survey goes at this. I think they could combine the history with the geology very well, but their geologists are not particularly concerned about the people involved, and I was very much concerned with the people involved. I've known and respected all these geologists very much through the years, but it seems that that's not their objective. Their objective is just the rocks, and my objective was to gather everything I could in regard to history before it died.

Yes, that's important. That's what makes it such an important work. When I first saw it, I thought, "Oh, this is great. If there's one on every county, then we have like a benchmark, you know, of the 1950s."

Yes, that'd be great, if you had it.

I mean, there's probably pieces and parts, if somebody would work to pull some of it together, but a lot of the people would have moved on and be gone by now.

Yes, that's right. Going through all kinds of literature by the Geological Survey, I note that there's no great concern about the people involved.

Yet there wouldn't be this information if human beings hadn't found it.

That's correct. Yes, I got a lot out of just talking to people.

It was through some of this work and your work on iron ore deposits, then, that you ended up with Ford Motor Company.

Yes, that's right. First of all, you see, I drilled some of these iron ore deposits when I was with the U.S. Bureau of Mines, and then I wrote reports of investigation on my results, and then later, I worked for the Nevada Bureau of Mines in cooperation with the Geological Survey on a study of iron ore deposits.

When the Ford Motor representatives came to Nevada, how did they locate you?

Well, of course, when they came to Nevada, the first thing they would probably do is look up what literature was available, and they would run into literature that I wrote. The reason that Ford came out here—and they weren't the only iron ore people that came out here; there were others too—they were looking for what we call a hard-lump ore, which was used in the open-hearth furnace method of converting pig iron to steel, and it so happened that Nevada was a source of high-grade magnetite, which fit their needs just perfectly. Nowadays, the steel industry no longer uses the open-hearth method.

So you said Nevada has this resource, and yet you were hired to go back to Michigan to oversee their resources. Can you tell me more about that job?

Well, what I did in Nevada and what I knew about Nevada iron ore had no connection with what they wanted me to do in Michigan. Old Henry Ford wanted to be self-sufficient in everything—in iron ore, timber. He even bought a lead mine in Idaho, because he wanted lead for batteries. He got involved with rubber plantations in South

America for tires. In later years, still following the same general idea, Ford Motor Company wanted to be sure that they were not at someone else's mercy for glass sand, and they sent me out to find a glass sand deposit of their own in case somebody wanted to charge them too much for glass sand. By the way, that's the only ore deposit that I individually found without help from anybody else. [laughter] I found that in Tennessee, I think it was. Well, I found it, because I found out how other people were cleaning up a glass sand which was not just perfect, and using this idea that somebody else had, I found a glass sand deposit that was not perfect the way it was, but required very little washing to make it just exactly what they wanted. So Ford Motor Company still owns that glass sand deposit.

And did they actually use it?

I don't think they had to, because they could buy it from a supplier just as well. They had it as a club, so that somebody couldn't stick them with the price of glass sand. It was principally a negotiating item.

How did you find it? You were watching what other people were doing?

When I knew what could be done, I talked to people and looked in the literature and found out where the proper geologic formations were in certain areas, and I could just go there and look at the material, see it on the ground.

My principal work for Ford Motor Company was to look after their mineral rights in the Upper Peninsula of Michigan. When I first came to Michigan, Ford Motor Company had recently shut down an underground iron ore mine, because they could buy the ore cheaper than they could produce it themselves, and the mine and its mine buildings and so forth were just surplus to them. I

guess my first job was to sell off what I could from this mine, so far as superstructure was concerned. Then, after that, it was to do what I could to get more details on iron ore on Ford Motor Company lands, and also look after Ford's interests in their partnership agreements with other companies that were mining and beneficiating iron ore.

I came there about the time that the various companies started talking about, or actually working on, what they called taconite, which in Minnesota is a low-grade magnetite. It is ground and beneficiated by magnetic methods to make a higher-grade product. In Michigan, Ford was working with Cleveland-Cliffs Iron Ore Company to beneficiate a low-grade hematite ore by flotation. This concentrate was later pelletized to make an ideal blast furnace feed.

So the taconite is a low-grade magnetite iron ore in Minnesota?

Magnetite is a magnetic iron ore mineral. Hematite is a non-magnetic iron ore mineral, common in the Upper Peninsula of Michigan. The taconite industry in Minnesota is largely built on the fact that taconite itself is a low-grade magnetite, which is magnetic. Therefore, when ground it can be concentrated magnetically to go from about 25 percent to 60 or more percent iron.

Where were all these holdings? Where were all the mines—just in Michigan and Minnesota?

My principal work was in the Upper Peninsula of Michigan with a little in Minnesota. My activity was principally in the Republic/Ishpeming/Negaunee area. It was all within a hundred miles. I was in the district quite a bit, about halftime. The company—more for negotiating purposes than anything else—thought that old Henry Ford's idea of being self-sufficient had merit.

So does that mean that the actual materials out of the mines were not used by the Ford Motor Company?

When I came into the picture there, I was looking for more iron ore, and I did find some, but that was never mined. These iron ore reserves were probably advantageous from a trading standpoint. They could probably lease these, or enter into some kind of an agreement with Cleveland-Cliffs, as an example, where they would mine them, but none of the additional iron ore that I found was ever actually mined while I was there.

I might also mention about old Henry wanting to be self-sufficient. Remember, the early station-wagon bodies were wooden, and, therefore, they wanted maple hardwood for the station-wagon bodies. That prompted them to build a station-wagon-body plant in Iron Mountain. They had about a half a million acres of forest lands in the Upper Peninsula to draw on for the hardwoods for the station-wagon bodies. Later on, these lands were transferred to the Ford Motor Company Fund. The fund is one of the groups that give money away. Ford Motor Company makes the money, and the fund and the Ford Foundation give it away. The timber holdings were given to the Ford Motor Company Fund, but the mineral rights were retained by Ford Motor Company.

So this is interesting in that, while you were working there, you were locating new ore deposits, working on the production of the ore in the mines that existed, and yet, those products were not necessarily used by Ford Motor Company at that time. Is that correct?

The production that was made by companies with which Ford was associated—part of that production did go to Ford Motor Company. Yes, Ford obtained its share, either by purchase or otherwise,

but Ford did utilize that product. In some cases, they were for negotiating purposes; in other cases they were not, but most of Ford Motor Company's activities in the Upper Peninsula were in conjunction with another company, and Ford got its blast furnace feed out of that arrangement.

I see. So what you were doing was very vital to the production of blast furnace feed for Ford's steel plant. How long were you there?

About fifteen years. I much prefer being out in the hills, prospecting and so forth, and dealing directly with people actually in mining. That was an entirely different story. You have to keep in mind that I was the principal employee of Ford Motor Company in the Upper Peninsula of Michigan, and I represented Ford, therefore much of my work was really in public relations. I had had no work in public relations whatsoever previous to that, but, somehow or other, I fit into it pretty well.

Yes, maybe that interest in people?

Yes, that's right. That's what it required—interest in people.

Has that philosophy for Ford changed, about having all of its own supply sources?

Gradually, it changed. However, it did not change entirely. There are many suppliers competing now so that Ford doesn't have to worry too much about its raw material supply, but it will always keep itself in an assured position. By and large, I think Ford is as self-sufficient as it need be. It doesn't need hardwoods anymore. Glass sand is about the only raw material that could give them problems, but they've taken care of that. Iron ore—there are all kinds of suppliers from whom they can buy iron ore.

So they found it to their advantage to work with other companies to assure themselves of having a good blast-furnace feed at a decent price.

A lot of things changed while I was with Ford. This was the period when the concentration of low-grade iron ore to a better product as a blast-furnace feed was being developed. That was very important to me. They could use a lower-grade material to finally end up with an ideal feed to their blast furnaces. They had been working on this for years before I got there, but the last stages of perfection were developed while I was there. I was very fortunate to see that being developed all the way down the line.

Yes. Did that process change the industry then—the mining and manufacturing industries?

It changed the industry in that they could get much more production out of the blast furnaces; they could make a better product. About the latter part of my stay with Ford Motor Company, we got away from the open-hearth furnaces and are now using what they call an oxygen-lance method to remove the carbon from pig iron and produce steel. They make much better steel now than they did before.

That must have been exciting, I mean, all way around.

It was. Yes, the death of the open-hearth furnaces and the beginning of the oxygen-lance furnaces, that all happened in the Dearborn area. I didn't see much of it, but I was there during that particular time.

What made you decide to leave the Ford Motor Company?

I always wanted to return to the West. Also, it was no longer feasible for Ford Motor Company to keep an office in the Upper

Peninsula of Michigan. There was no need of that, at all. So they decided that the best thing for me to do was to move the office to Dearborn. I had previously spent six months in Dearborn to get better acquainted with Ford Motor Company, and I wanted no part of that. When they gave me the option of early retirement or coming to Dearborn, it took me a split second to say, "I'll take early retirement."

Why didn't you want to be in Dearborn?

Too many people. I don't like large corporations and the way they operate. Although I'm a believer in Ford Motor Company, many of their ideas I just couldn't stomach. You know, in a corporation many feel that you do everything for the benefit of the corporation and forget about the people on the sidelines, and I noticed that in some of the people in Ford Motor Company, and I wanted no part of that. I also, by the way, met some of the finest people I've ever had the occasion to know in Ford Motor Company.

But the change from moving to the Upper Peninsula, where you were sort of on your own and functioning—even though you were part of the corporation then—you had a lot of independence up there, and then, coming back into Dearborn, that would have changed. You would have been right in the corporate structure.

I would be answering to half a dozen people. I didn't like that. Also, I had come back to the West several times, and I decided I could make it again here in the West.

So when you left there, what did you come back here to do?

Well, it didn't turn out that way. [laughter] I had an opportunity to go to work for Hanna Mining Company, and they put me

back here in the West. I was with them for six years in Tucson, Arizona. The Upper Peninsula of Michigan has a relatively cool climate compared to Tucson. We moved in March, and it was quite a change, climatically. After six years, I had the opportunity again for early retirement. By that time I had investigated the Reno area and found that I could get along here, so I came back to Reno.

What have you been doing since you've come back to Reno?

Most of it was consulting. [laughter] My first job, though, was a short job in 1976 with Art Baker, who wanted to have a class in prospecting, and being as how I had done this, he said, "Have at it." I was involved with a prospecting class up at the University of Nevada for a short period.

And did your prospecting class change from the one you did earlier in your life?

Yes, it was quite a bit different. It was more lecture work, although we did take some field trips, but as Art Baker so aptly put it, "If you know something about mining and prospecting, if you are a prospector, this is not the place for you. This is for those who know nothing about the prospecting whatsoever." Previously, I had worked with groups where at least half the group knew something about prospecting, and they had claims of their own. Previously, when I was teaching prospecting classes and working with people who knew something about it, we would have a better rapport between us, talking about what we saw in the field and so forth. Here we were dealing with people that knew practically nothing about prospecting, and, therefore, it was different, very basic.

Were any of the methods that you taught different in the 1970s versus earlier??

Yes, earlier, I actually got people to do simple, blow-pipe charcoal analytical work. Now we did nothing like that. We taught a little, simple, general geology, you might say.

But earlier you actually familiarized the prospector with mineral specimens.

Oh, yes, taught them how to identify minerals.

But the methods of prospecting had not changed?

Yes, the methods of prospecting had changed quite a bit! Years ago the prospector relied quite a bit on a pan to identify gold. Nowadays, you're working with a lower-grade material. You're working with gold mineralization that is so fine that you can't pan it, so you have to send it to an assayer. That's all there is to it. Nowadays, you rely more on the general appearance of the rocks and somewhat on mineral associations. You might locate claims in what you think is a good area, and from then on, you turn it over to somebody that knows more about mineral exploration. The old prospector of many years ago really couldn't do very much with what we're dealing with nowadays. To identify the minerals may require a different technique.

So then you taught, and more recently you've been working as a consultant?

Yes, I did most of my work with Homestake Mining Company. They just moved. They're somewhere near Wild Waters in Sparks, Nevada. They're not a local company; they have a local office. They've been in the Reno/Sparks area for many years.

And where are their operations?

Well, Homestake Mining Company is principally known for the Homestake Mine at Lead, South Dakota—an old, well-known, underground mine that has had a large production. They're beginning to open up an operation near Eureka, Nevada—a gold mine. They have a large operation in northern California near Napa Valley. That's the best I can describe it. I believe it's in three different counties there. I worked on that California project doing some surveying and record work.



We are looking at the photo of the operation at Round Mountain that you were talking about. Would you describe that just like you did to me from the picture?

Well, they called it a scarifying drag, and I note here in my bulletin that I said it weighs 7,200 pounds. Well, that's almost four tons of steel. It's about six-by-six or eight-by-eight feet square, and it has large teeth on it, something like the scarifier teeth that are put on a Caterpillar tractor, but probably not that large. The crane sitting on the edge of the pit drops it down, or possibly lowers it along the walls, because it'll do some scarifying on the way down, and then it pulls it back up, and this scarifier drags on the gravel as it's going upward and cuts the gravel loose. The gravel falls to the bottom and is eventually picked up by a power shovel and loaded into trucks.

And it goes on this conveyor?

Yes. The trucks haul it to a central point where it is dumped onto a more or less moveable conveyor about 200 feet long, and that short conveyor dumps it into a bin that feeds the main conveyor. That eventually takes it out of the pit to the plant itself, which is about a half a mile away. It's the open-pit mining of gravel in this particular case. Now

keep in mind, this is nothing like our open-pit mines in Nevada, now mining gold ore. This is gravel we're talking about, and it's a washing process.

OK, so this is not a process that would be used in mining gold?

This is mining gold. These are gold placers. The gravel is pretty deep there, and it was valuable enough so that by handling large quantities they could make it pay.

And so this process has not been used anywhere else that you knew of because of the type of the material—the gravel?

The only other place where it could be used would be in the type of gravels that you have exposed in California in the old hydraulic mines. The cliffs are about the same; you could probably use the same idea. The only problem is, what are you going to do with the tailings? In California you'd have a real problem.

You can see, for example, along the Feather River Canyon between Portola and Quincy, where they did hydraulic mining, those cliffs look the same.

That's correct. They look the same, except that the Round Mountain material may be more consolidated than what we see in the old hydraulic mines. There is no way that I can imagine this method being used for anything except gravel. In this particular case, we just happen to have a gravel in Nevada and not very much water, but by mining it this way, we could handle it in a plant that requires little water.

There are many places in Nevada where hydraulic mining has been used. One of them is just below Virginia City in the Gold Hill area. Somewhere in the eastern part of the state they also used hydraulic mining.

That was earlier—before the turn of the century, correct?

Yes.



Vic, most of your experience has been in exploration. Have you seen quite a bit of change in the methods used in exploration over the years?

Yes. Earlier in exploration there was more of a tendency for the geologist or prospector to be sampling actual outcrops and particularly concerned with that. Later on, I found that it became more prevalent to take samples of the chips that were found in the soil, trying to find an anomalous area of mineralization. Simultaneously, we took soil samples for the same information.

When you first started to school, that was not the way that you went prospecting. Is that correct?

Yes. About the time I started in 1928, the prospectors were usually involved in looking at the rock in place. Then later, we also became more involved in the subtle changes in these rocks. We started looking for what we call color anomalies, where the sulfides that are in the rocks change to acid, and the acid, in turn, bleaches the rocks giving us a bleached effect and color, and that gives us a target. It indicated that there were sulfides present, and those sulfides could have carried gold or silver, or been associated with other metals such as lead, zinc, or copper.

I think the dramatic change came about in the early 1930s. The Getchell Mine is the best example that I know of, where we suddenly realized that there was a lot of gold present that was not visible and very difficult to find by ordinary panning methods, and so, about that time, we realized that we

had to actually assay the materials to find the gold.

So that was the beginning of starting to find gold that was finer than what you could see?

Microscopic gold—what the early prospectors at that time referred to as “no see ‘em” gold.

“No see ‘em” gold. [laughter] So that’s not recent. I mean, that’s 1930s. A lot of times people talk about the Carlin Trend, for example, with its microscopic gold.

This happened long before the Carlin Trend, and although people usually think about the Carlin Trend being the first important evidence of this microscopic gold, that’s not true. It started before that. Definitely, the Getchell Mine was an example of this. Whether there are other examples or not, I don’t know.

Tell me about the Getchell Mine. Did this happen while you were working there?

Oh, no. I never worked at the Getchell Mine, but it’s the first time I was aware of this, and I remember being very much interested in the mineralization at the Getchell Mine. That was in the 1930s, I think, when that property opened up, and that gold definitely had to be assayed. There was no visible gold there. Also, it was tied up in or associated with other minerals.

So it not only had to be assayed, but you had to figure out how to separate all of it.

Yes, that’s right. The Getchell Mine was a challenge, with high arsenic content for one thing. If the Getchell Mine was discovered today, we would have to do things a lot differently than they did then. The arsenic ore was first roasted to make it amenable to

cyanide extraction. The roasting spread arsenic all over the countryside. I remember so well in that camp, dogs were a rarity, because dogs would get out and get the arsenic on their paws from the ground and then lick their paws, and soon it was the end of the dogs.

Oh. So it was really hard on dogs, wildlife, and so on—the methods that were being used?

Yes, and also, it might have been hard on sheep and cattle, too. I really don't know, but I suppose there was some problem. We had little in the way of environmental control.

Was there concern about the environmental impact of that?

Oh, yes. There was concern about the arsenic, and I guess the company did the best they could.

Was it publicized, or how did you become aware of the concern about the arsenic?

Well, being in the camp, talking with the mine staff. Fact is, I had a prospecting class there in about 1939 or 1940, and that's when I learned quite a bit about the process. Of course, it was known well before that by people in the mineral industry, particularly by the people right in that area. The general public was not concerned, because they didn't know the details.

What kinds of limits would be put on that mine today, if they found an ore body with that much arsenic in it?

I think that they would have to make provision to remove practically all that arsenic from the fumes before they could be released.

And that's what wasn't done back then—it was just released?

They removed a lot of it, but not enough of it. They tried their best at the time to clean it up, but it was very difficult to do. Nowadays, we probably have technical abilities that we did not have then to remove the arsenic.

So really, it seems you're saying that as the environmental concerns have increased, so have the technical changes to address them.

Oh, yes. It has to be. In other words, production goes on, and you've got to figure out some way to keep going.

Can you give an example of your observation of how environmental concerns have changed operational methods?

No, I really can't give you a definite point right now. I do know that there was a time when we used rather simple, but not entirely efficient, ways to remove unwanted materials out of fumes. Later, we developed more efficient electrostatic methods to remove these materials. I don't know just when that happened. It was pretty early.

Can you give me some examples or tell me a little bit about your work now, because you're continuing to work, correct?

Well, about fifteen years ago or so, a group of us got together and formed a small company to look for areas that we felt had mineral potential. That developed into what became known as VEK Associates, and it was started by Ralph Roberts, Bob Reeves, and myself. We located a lot of claims; and, of course, we leased these claims out. Much of my work has been involved in watching these leases and taking care of the necessary paperwork. Actually, I have not done

much geologic fieldwork in quite a number of years.

We did preliminary exploration on the claims that we had located, and, if we had any encouragement, we went on from there. Of course, we simultaneously had to get a little extra money for that work, and we brought in a man in the oil business for whom I had done some consulting work in the past, Bill Andrus, who supplied the money for this. Therefore, the organization really became VEK/Andrus Associates. The money was used to do more extensive preliminary exploration. We didn't have the money to do extensive drilling.

After our preliminary drilling, if we had had some encouragement, there was usually somebody around that was very willing to lease the claims to continue the exploration, and that finally resulted in the Marigold Mine out of Valmy, which is still operating on a small basis. That was a pretty good producer for about ten years or so. It's strictly gold. It's an open-pit operation. We got involved in that, because we knew about the old Marigold where Frank Horton had made a little money. In that vicinity the geology was such that Ralph Roberts felt that the lower plate rocks, which was our geologic objective, were not far from the surface, and we did a little geophysical work there that confirmed that this was the case. So we drilled that, had a little encouragement, and then felt that maybe we could do better by getting a little bit closer to the old Marigold, so we asked the driller to move down the road closer to the old Marigold. The roads were in pretty bad shape because of wet weather, so he just stopped where he had to and put down a hole, and we got quite encouraging results. Simultaneously, Andy Wallace of Cordex was in that area and was interested. He immediately leased that ground from us, which finally resulted in the Marigold Mine. Oddly enough, that particular hole, which started all the excitement, you might say, to date has not developed into an ore body. In the

drilling around there, Andy found the ore body itself that made the Marigold Mine, but it was not tied to the hole that started the activity there.

Interesting. And if the roads hadn't been bad, would he have been able to go further and missed that point?

Could be. He wouldn't have gone much farther, because we definitely didn't want him to get right up to the property boundary. I don't believe in drilling on a property boundary, because you're drilling for the other fellow, too. So he could have gone a little bit closer to the other property, but a lot of luck was involved.

That's what I was getting at, because of all of the old stories about, you know, Jim Butler throwing a rock at his mule and those stories, where it was just luck that they found certain claims. And was that kind of the case in this, the bad weather and everything?

Any geologist knows now that luck is a very important factor in finding an ore deposit. [laughter] Oddly enough, after that first hole that gave us our encouragement, we moved somewhat closer to the boundary, but off to the east as well, and put down another hole, and it was almost a blank. It had a little bit of gold, but not very much. If that hole had been our second one, we might not have done anything about it.

In summation, a lot of that is luck. Sure, it started with geologic reasoning and followed with geophysical confirmation, which resulted in the first holes, which gave us a little interest.

Yes, but from there it was the bad weather and the bad roads.

The second hole was put down because the driller just couldn't go any farther.

When you say geophysical work, would you define that for me?

In this particular case, we're using simple seismic methods to determine where the thrust fault was shallow. It was not very deep. We wanted the rocks below the thrust fault. Our endeavor was to sample those rocks below the thrust fault, which we did.

You said that Andy Wallace was in this area, and he was with Cordex, and he leased the property?

Yes, Andy Wallace, who is the manager of exploration for Cordex, was in there, and they realized the importance. I believe that mine has produced in the neighborhood of \$70 million in gold.

So that's one of the better ones in Nevada then, is that right?

Well, it's a smaller one. It's extremely small, considering what has been done on the Carlin Trend.

And how close is that to the Carlin fault?

The Marigold must be about sixty miles west of the Carlin Trend. The Carlin Trend is north of Carlin, and this is south of Valmy.

And the Marigold, was this also the microscopic gold?

Oh, yes, very definitely. Yes, it's microscopic gold.

Do leases today work similar to what they did back in the 1930s? Because I know there was a lot of leasing of the mines and so on at Silver Peak. Is it structured the same way?

No, those smaller leases, like Silver Peak—I think there we were talking about

individuals leasing ground and taking out the ore and shipping it to a mill. This is an entirely different matter. Here, you lease the whole property; and then the operator, who is the lessee, does further exploration, develops an ore body, sets up a mill, and mines that ore body, and pays a royalty to the property owner. Leasing of that sort is a pretty major scale as compared with the individual leasers.

In one Silver Peak mine they had just a certain amount of feet that they could work. When you found this, was the property yours, or is it a claim on the property?

We located a lot of claims there, and we were also checker-boarded in that area, checker-boarded with the railroad. So when Cordex came into the picture, they had to work out an arrangement where they also had control of some of the railroad land, so they had to make arrangements with the railroad.

When you say checker-boarded, are you just describing that the railroad owned some of the land?

Every other section.

And so the person or company who leases has to work that out?

Yes, they probably want some control of adjacent railroad land, because they don't know the extremities of the ore body. So that's the reason that the railroad gets into the picture.

The VEK/Andrus Associates—has the Marigold been its main project, or are there others?

We have some claims just north of the Barrick and Newmont operations; and, there again, Cordex had a lease, and a small ore body was taken out near the surface. How-

ever, that is now leased by Homestake, who is working in a joint venture with another company. The exploration there requires deep drilling that is around 2,000 feet. This has resulted in some pretty good gold intercepts, but the project will require much more drilling. The present operators are confident that by re-examining all the drilling results and geologic information they can properly plan further drilling. At this time the company is setting up a new drilling program. That's a pretty good potential. It's extremely good real estate; it's in the right place. We just hope there's an ore body there.

Do you get out to the properties very much, or is most of your work just the paperwork for the company?

I seldom go into the field on these properties. There's no need of going. There's nothing to see out there that I don't already know about. Since the death of Bob Reeves, I'm acting as secretary-treasurer, so that means I watch the royalties and see that they are properly distributed and keep a close eye on the leases. I'm also involved with a small company called Frazer Creek Mining Company, which has claims in the Midas area and also in the Buckskin area north of Winnemucca. I'm secretary-treasurer of that, too. There isn't very much to be done in my part there, but once in a while I do get out in the field. I'm involved with two others on that, Bob Hatch and Ken Jones. We invested some of our own money in that some time ago. We drilled one of the properties and found some pretty good gold intercepts. As we don't have the finances to do much drilling, we're just in the process of leasing these properties out to a company that has drilling plans.

What part of all of this do you like the best? It seems like you are of retirement age, and

you could be doing nothing at this point, but you're still very much involved.

Well, I'd like to spend more time in the field, principally, to use some of my own exploration ideas. About thirty or forty years ago, I was introduced to a soil geochemical testing idea, which is sometimes referred to as the "Bloom method." It's also referred to as "heavy metals field testing," whereby a simple kit is used to detect zinc, lead, and copper in the soil. My personal opinion is that almost all ore deposits have some zinc associated with them. Zinc is the one element that's picked up easiest by this method. Therefore, if you test soil samples in the field, you can immediately outline an anomalous area that may well be worth drilling. That's something that's very exciting to me, but not necessarily to some of my associates. That makes no difference to me. We also have other ideas that we can kick back and forth among ourselves.

Yes, but you can get out from time to time and try this method?

Yes, that's right. I also have used this method to help people with whom I'm otherwise associated, to give them a better idea of what they might have on their property. As an example, I have a druggist friend, who has some mining claims, and so what I do is, I help him with prospecting, and he helps me with my medications. [laughter]

So you've been staying really active and involved in mining. It's not something that you're ready to give up, are you?

Not very soon, not by any means. I want to keep at it as long as I can. My formula of keeping alive is to keep your foot in the door, so far as your work is concerned.

Mining is also something—from what I can see in talking to people—that kind of gets

in your blood, does it?

Oh, yes, it does. I recently purchased a metal detector, with which I'm going to do a little fooling around, but that's a whole new field. I've got to learn something about that. [laughter]

You mentioned Homestake, and I wanted to find out a little bit more about the work that you've done with and for Homestake.

Well, I did a lot of varied consulting work for them, from searching records, to surveying, to examining prospects. That's all in the past. That stopped quite a long time ago. I keep in touch with them. After all, they're very much involved with one of our properties that we and they think has potential. That's the one that's just adjacent to the Newmont and Barrick operations on the Carlin Trend. It is leased to them.

We talked about the fact that early in the 1930s and on through the 1940s there were a lot of people who did prospecting to supplement their income and whether that's possible anymore. Would you talk a little about that, because you have some experience from your prospecting classes and on up into the present?

Yes, I found that there were early-day prospectors in the 1930s who would spend their extra time in the hills looking for some potential ore deposit. They would contact a company that would, in turn, continue that exploration and pay these people a small advance royalty, and this would supplement their income. Nowadays, it's so costly to do this exploration. Analytical work costs money, and it's difficult for an individual to do this like they used to do in the 1930s. If it is just a few samples, say, ten samples or something like that, you're facing something close to a hundred-dollar cost. The average individual can't support that. Your prelimi-

nary work would end up to about ten samples, but if you did any follow-up work, pretty soon you're getting into at least twenty, thirty samples or something like that.

Yes, so the cost goes up pretty fast. You've got to have a way to pay for that, so it's just not done as much anymore?

No, the individual doesn't do very much of that.

So it's more effective the way you're doing it; that is, joining with others to spread out the cost.

Yes. Individual geologists often cooperate with each other to strengthen their ability. However, we were unique in putting together geologists and engineers into small corporations—to spread out the cost, as well as being more versatile. I think there are others doing something similar—an association of a couple or three consulting geologists, who are simultaneously looking for properties or ground that they might turn over to a company for additional exploration.

So is it a matter of consultants helping to fund their own exploration?

Yes, they've got to have funding somewhere. So these people, who join together into an association, or whatever they want to call it, have to do something to bring in some money, and usually it's consulting.

The old concept of the grubstake, only modernized?

Yes, that's right. It's modernized considerably and yet somewhat similar. The grubstake idea, where someone pays for the prospector's food and in turn gets an interest in whatever is found. I don't know if that's

done very much anymore. However, in the case of VEK Associates, Andrus paid the actual exploration bill, and VEK supplied the know-how. This resulted in a partnership, VEK/Andrus Associates. Different, but similar.

The early grubstake idea was still used in the 1930s. I worked on a property in about 1930 where an individual grubstaked us by supplying our food and supplies; and they, in turn, would have a definite interest in whatever we found.

Now it's usually a matter of each exploration group basically grubstaking themselves by their consulting work.

Yes, they do. There may be companies that are grubstaking prospectors or geologists, but I don't know of them.

So when you're out prospecting, there's always the excitement of the next find, isn't there?

Oh, yes. You can't say we've found it all by any means. No matter who you talk to, whether a layman or otherwise, they'll usually say, "Well, it's been so successful in the past, I don't see why there can't be some ore left." [laughter]

It's interesting, in some of the things that I've read, there are predictions that there will be an end to our resources in Nevada. There just won't be any more gold, and all the miners will go to South America or Africa or something.

[laughter] You'd have to have a pretty good crystal ball to say when we're going to run out, because it's been going for quite a while. There's an awful lot of territory involved, and there probably will be new methods developed that will make it easier to find ore, so now it's pretty hard to say when we're eventually going to run out.

Do you believe in those predictions personally? Do you believe in those that say, "Twenty years, it'll all be over?"

Oh, no, not at all. I remember years ago when I was in school studying oil, and all kinds of predictions were made that we'd be out of oil in twenty years or something like that. We've got far more oil in the United States now than we had at that time. So they keep working and keep finding more.

Is there anything else that you would like to cover that we maybe haven't?

When we first came up with the idea of some of us pooling our knowledge and forming a company and locating claims in favorable areas, it was Bob Reeves, who is now deceased, who came up with that idea and should be given full credit for the thought that, for the three of us who had been involved in Nevada for so long, it would be well worthwhile to pool our knowledge and see what we could do.

And work together, because you all had a really good understanding of the state.

Yes. Ralph Roberts was probably more knowledgeable by far on the geology of Nevada, but it also took the plain, good horse sense of exploration to move this thing ahead.

Yes, so it's been a good threesome to work with. Now you said Bob Reeves passed away. When did he die?

It must have been in December of 1995, I guess. The company has been operating since about 1981.

JOHN S. LIVERMORE

VICTORIA FORD: *Today is March 8, 1999. I'm here with John Livermore in his office in Reno, and today we're going to be talking about his work in Nevada. John, before we start, I want to make a note that Eleanor Swent from the University of California, Berkeley has already done some work with you, so what we're going to be doing today is developing some specific topics related to Nevada, rather than duplicating the questions that you've already worked on in your oral history with her. I just want to make a note of that, so that people who are interested in finding out more about you can refer to that project.*

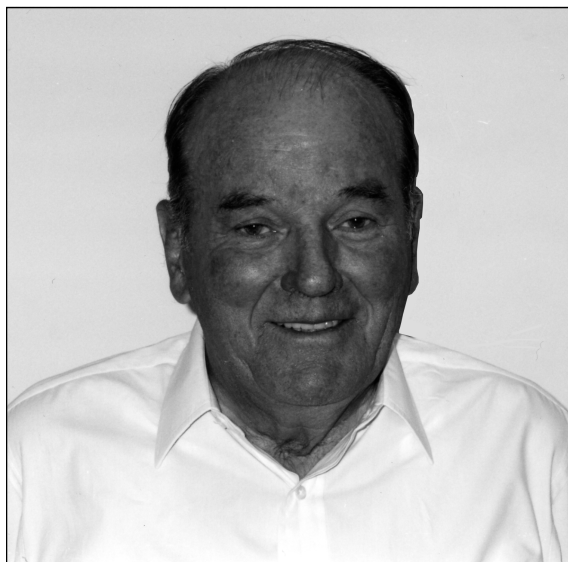
So that we have the tie to Nevada, could you give me a brief background on yourself and tell me when you first came to Nevada?

JOHN S. LIVERMORE: Yes. I first came to Nevada in 1940 as a part of our summer geology course at Stanford University. At that time the format was to spend the first half of the summer in a so-called "soft-rocks and oil environment" and the second half in a hard-rock mining environment. At that time they were usually picking sites in Nevada which were mining districts. So we

actually came to Nevada and did a thorough mapping job of the mine outside of Winnemucca, which was called the West Coast Mine at that time. So that was my first experience in Nevada.

Does that mine still exist?

No it doesn't exist. It was about ten or fifteen miles northwest of Winnemucca. We camped there, and we did a very thorough topographic, geologic mapping, underground mapping of the whole mine as a part of this course. At the same time we took side trips, and one of the trips that we took, which is important as far as the later part of the story, was to the Getchell Mine, which was operating at that time. That was interesting because it was a Carlin-type deposit, which had not been recognized as such, but there was an interesting story, even at that time, about the fact that gold was so fine that the old timers had missed this big outcrop, which everybody had banged on and panned, but they didn't discover the gold until 1939 because the gold was so fine it couldn't be panned. So that started me on the idea of this fine, disseminated gold.



John Livermore

So, you were a student at that time, just there for the summer?

Just for the summer, yes.

And when did you come back to Nevada, then, after that?

Then I came back in 1949. Well, I had been working in Colorado and then down in Florida for a while. I had wanted to come back out West, and there was an opening at a gold mine up near Lovelock called the Standard Mine, an open pit. Incidentally, that was also a disseminated gold deposit, a small one. I was brought in there to help them. The mine was struggling—one of their pits had caved in, and they were desperately looking for more ore, so I was brought in to supervise their exploration program, a drilling program, to try to keep the mine going. Unfortunately, they were at such a low ebb that even though we did find more ore we couldn't get that thing going. So the mine actually shut down shortly after I arrived. I was only there about three or four months in 1949.

By then what had developed in terms of your understanding of the disseminated gold?

Well not very much, really. I thought it was curious—the fact that this story about the Getchell Mine, normally, would have been discovered way back at the turn of century, with all the prospecting that was going on, but because the gold wouldn't pan, it wasn't discovered until 1939. That kind of stuck in my mind.

Did it connect to you that Lovelock and the Getchell Mine were similar?

Yes, they were. They're a little bit different; they're in different rocks, but they were somewhat similar. Standard was kind of marginal; it wasn't the classic Carlin. It wasn't in the Paleozoic; it was in younger rocks. Well, also, both of the deposits, of course, pointed to the fact that there were deposits in Nevada big enough that they could be mined by open pit. Even in those days they were actually mining gold deposits by open pit, but they were small compared to these modern pits.

The open pit mining was fairly new in 1949?

Ah, no. Open pit mining in copper had been going on since the turn of the century. It was fairly new for gold because most gold deposits that were narrow veins had to be mined underground, so open-pit gold mines were kind of unusual.

So, the Standard Mine might have been one of the first ones that opened in Nevada?

No, the Getchell was much older. That was open pit, and there were some open pit mines in southern Nevada. I would say there were a lot of them around. There was one down at Northumberland. You see, in the

1930s, when the price of gold went up, there was quite a lot of activity in gold. The increase in the price of gold changed the economics of gold, so some of these low-grade deposits which wouldn't have been mined before, could be mined by open pit. There was definitely a renewed activity in gold after 1933, when the price of gold went from twenty dollars to thirty-five dollars.

So, did open pit mining start back that early in Nevada, in the 1930s?

Oh, yes.

I think the public has the idea that open pit mining is a phenomenon of the 1960s.

No. Well, of course, there were the copper mines in Nevada, and they'd been going, like the Anaconda at Yerington, Ely, so those were very large open pit copper mines in Nevada. No, open pit wasn't anything new, but it was new in the sense that gold, before the 1930s, was not mined by open pit. These were fairly small compared to modern pits. You're talking about a few hundred tons a day, instead of thousands or tens of thousands of tons. In scale there was no comparison.

In the 1960s there was enormous volume, and the gold pits became the size of the copper pits. There had never been anything the size of these copper pits, where they're mining thirty thousand tons a day. Then, when the Carlin started, they were mining on the same scale as the copper mines, and that's the first time that had ever happened.

You came back in 1949 to the Standard Mine, and that was open pit. From there, did you stay in Nevada?

Well, I stayed in Nevada. At that time I was interested in prospecting. I very early

developed a love for prospecting, so I liked Nevada, and I was kind of footloose after this mine shut down. I decided I'm just going to stay in Nevada and prospect. I was kind of working on my own. I had a friend that lived in Lovelock, a fellow named John Heizer, and I used to do odd jobs for him to make a little bit of money. I just barely made enough to keep me going, [laughter] and then I'd prospect on the side.

I was studying the literature, and I came up with some interesting things at that time. A mineral called perlite was kind of important, and I found a perlite deposit. Incidentally, as part of my travels, I actually went up to the Carlin area, because at that time there were some small, high-grade mines up close to the present Carlin ore mine. I don't know that I actually walked over the Carlin ore body, but I was fairly close to it. Well, in those days I was just looking specifically at these high-grade veins, which were nearby. I didn't spend much time there, really, but I remember them, taking samples there. Any way, I worked around different places. I worked over in California; I worked down in Death Valley. I did several odd jobs and prospecting, but I realized that I really couldn't make a living at prospecting, because in those days, in this country at least, they didn't have the system of supporting prospectors like in Canada and other places. So-called grubstakes came later, where as a prospector, you could go to a mining company and be paid a salary and maybe be paid for assays. In other words, you could keep alive while you were finding something, but in those days there was no opportunity for that. I had no other source of income, so I decided I had to go to work for a corporation.

Grubstakes were something early on in gold mining?

Oh, well, way back. I really kind of revived that in 1970, giving incentive to prospectors, because I had had the experience in Canada. Canada had had that system for years and still does, because there's more virgin country in Canada, and there were lots of practical prospectors who were being grubstake supported. They were circling all around Canada making discoveries quite often back in those days. It's a little more difficult now. At that time there was very little interest in gold, because the price of gold hadn't gone up. Gold was always the attraction of prospecting. It went up in 1933, and that gave it a brief boom, but then costs were going up. That's what happened to Standard, which had been operated before the war profitably. They tried to open it up after the war, when I was there. Their costs had gone up, and the price was still the same. Most of these gold mines that they tried to reopen after the war weren't satisfactory, so by the late 1940s and 1950s the gold mining business had just declined to practically zero. There wasn't really that much interest in gold.

In fact, I wasn't particularly looking for gold. I was looking for things like barite, which was interesting at that time. I was looking for this perlite, for tungsten. It was those metals which were really more interesting than gold. People were just not interested in gold. So as far as following up on the Getchell, or anything like that, there was no incentive for it then. Anyway, that lasted until about 1952. Then I decided, well, I'm going to go ahead with a mining company. I had had several offers from different mining companies, but it didn't seem to be just what I was interested in. I knew about the different companies and their reputations, and I finally decided on Newmont, which I thought had a very good reputation for exploration, which I was interested in. The president was Fred Searls, who was a geologist and a very remarkable man. He had

done some very imaginative exploration things. I thought, "I'm just going to apply to Newmont for a job." That was really the first company I applied to. They did offer me a job, but that was not in Nevada, so I went to work in Colorado.

You just mentioned that Fred Searls had done some imaginative prospecting. I know that prospecting is your love. Could you tell me a little bit about what it takes to be a good prospector—both in skill and in personality?

It's a very interesting question. It takes a tremendous curiosity. It's a form of research, and like any kind of research, it first of all takes great curiosity. A good sense of observation is very important. A lot of it is hard work, just tramping up and down the hills. There are a lot of geologists that are not good prospectors, because they're interested in the geology. The prospector has, you might say, a tunnel vision. He's interested in finding ore. All his energies are directed towards that, and he's got a one-track mind. There is a quality about prospecting that is very hard to put your finger on.

When I was in Canada, we hired prospectors; that was a regular thing up there. We'd have a summer field season. As the geologist, and knowing something about geology, you'd suggest certain areas for a prospector, but then you'd take the prospector to an area and say, "Well, how about working this area?"

In the light of his experience, he'd look around and say, "No, I just don't like the looks of this area."

You couldn't tell him, "We want you to prospect there," if he wasn't keen on prospecting there, so then we'd move to another range.

Finally, he'd look around, "Yes. I think I like this area," and he'd spend the whole summer prospecting there. It was just cer-

tain things, sort of an ESP, you know. What it is, of course, is that you have the sum total of your experiences. You look at something—of course the geologist does the same thing—and something clicks in your brain. Why do you like this prospect? Some other geologist may come along and not particularly like this one, so it's a hard thing to define.

It's almost like that intuition. I've heard some of the underground miners from the 1930s say, "Oh, a geologist would tell me to go over here, but I had a sense about going over there." And that's what you are describing.

Yes. That's it. They always talk about a nose for ore. In Canada a prospector would go out and make a discovery, and they'd say, "Well, that's just luck." Of course, there is a lot of luck to it, but then the same prospector would go out and come back with a third or fourth or fifth or sixth discovery, and you'd have to say it's more than luck.

They have a sense about it.

A sense of it. Certain prospectors of the old school in Canada had done that. They'd had one discovery after another. They just knew what to look for and had a sort of one-track mind. I could show you—they relate it to research. It's the idea of someone making a new medical discovery or looking for hidden treasure. It's fascinating, finding something, I think, and that drives people on. I think it would be in that other U.C. Berkeley oral history, but I always remember that Fred Searls, who was a prospector, was getting kind of old, and he said to me, "John, you know, I'd just like to find one more." [laughter] I'm the same way. Why some people are better at it than others, I think, is something that's kind of a desire that gets into you.

Alan Coope called it being "gold bugs." Certain people just turn into gold bugs. They have to find the gold.

Well, that's right, but you can have the same desire for looking for other things, too, copper or other metals. Gold is certainly a particular fascination.

Have the techniques changed at all in the time that you've been prospecting?

Oh, yes, there are a lot of technical changes that the geologists use. When I'm talking about a prospector, I'm talking about the guy that is not a trained geologist; he has certain tools to use, of course. Things like the Geiger counter came along for uranium—that was a wonderful tool—and there came on another instrument called the beryllometer. They found a lot of beryl deposits, that they didn't know existed. For the broader field of exploration there are a lot of different methods which geologists and mining companies can look forward to using: chemical methods, geophysical methods, airborne surveys. So there are a lot of new methods of exploration, which aren't necessarily available just to the prospector. One of the biggest developments which was utilized in Canada was airborne; a lot of discoveries were made by these airborne surveys in Canada.

Describe to me what that means, airborne surveys?

Well, it means just flying over an area with certain instruments that can detect conductivity in the ground or the magnetic qualities of the rocks. In Canada you have an ideal situation because a lot of the area is thinly covered by glacial deposits, so you may only have ten or twenty feet that is completely covered, but the bedrock is not very far below the surface. So these surveys can

detect a conductive body, which has no surface expression, at all. A lot of these deposits in Canada were found which prospectors could not have found because there was no surface expression of them, so they were very successful in Canada. Those airborne methods didn't apply too well in Nevada because of the different types of rock we have down here. Then you have the gamma ray to detect any radiation. So there are a lot of new techniques, definitely. Things are changing all the time. They are coming up with new methods for deeper and deeper penetration. The induced polarization is one of the main ones. That's the one that Arthur Brant developed and used particularly to identify disseminated deposits. The electronics was particularly designed for detecting low-grade disseminated deposits, and there was no other method before that to find it. That was ideally suited for these big copper deposits, for instance, and worked very successfully.

Were you using that when you worked on the discovery of the Carlin?

No, because it doesn't work on gold. Trouble is, a lot of these methods that I'm talking about do not work on gold. Gold is unique. Really, in 1960 and later in 1970 when I came back, we went back to the standard prospecting methods—just climbing the hills and collecting a lot of samples; understanding the geology and mapping the geology and knowing what to look for. It was, really, going back to the basics. We would like to have used more sophisticated methods, but they just didn't seem to work too much in there.

So, that's what you did, when you and Alan were out looking over the Carlin area?

Yes, that's what we did. Then, when I came back in 1970, I decided to reintroduce the idea of prospectors, so I hired prospec-

tors. One of them was this Whit DeLaMare, who was a wonderful prospector and came up with several nice deposits, so it paid off.

And he was one of those with that sense?

Yes, he had that sense. He just liked to get out in the hills. He would do a certain amount of study of geological maps, and I would help him decide what would work, but a lot of it he did himself. He would look at aerial photographs and decide "Yes, I'm going to work in this area and that area."

Do you still go out?

I don't go out so much now. See, when I sold my company to Andy Wallace I sort of turned everything over to him, and I didn't want to be looking over his shoulder too much. I'd go out and look at things sometimes, but not as much as I did. As things come in to me I turn them over to Andy, usually. I have these projects, like in Honduras and New Mexico. I haven't been doing, as you might say, real prospecting so much because I've gotten busy on other things.

I didn't know if you might still do it as a hobby, head out into the hills.

Well, it is still a hobby. I like to go out, yes, and still try to.

I thought for somebody who liked to be out in the hills there's probably no replacement for that. It's interesting that, in spite of all this new technology that was introduced in prospecting for the disseminated gold, you had to go back to pretty much what the forty-niners did.

Of course, that was very interesting. There was an article written by the Council on Environmental Quality. I think one of the professors at Mackay School of Mines submitted the comments, and he said, "There

won't be any discoveries made in Nevada, only by super-sophisticated techniques, by big, enormous corporations." [laughter]

And then here you made this major discovery using old-fashioned prospecting.

Yes, and the later discoveries that were made. That was just one, but in the 1970s there were two or three more. A lot of them were found, and a lot of them were just around the surface. They were there because the old timers missed them. I'm hoping that we will develop deeper, and that's the purpose of the Arthur Brant Chair, to try and develop more sophisticated methods, to try to find these deposits at depth, which, of course, prospecting doesn't help on. So, yes, we have to develop new geophysical techniques which will penetrate down and try to help discover these deep ore bodies. What we were looking for, mainly, was ore bodies that were close to the surface, and it so happened that there were a lot of them around at that time. Now those are clearly more difficult to find.

When the price of gold went up, there was an enormous effort here in Nevada. There was a geologist under every bush, practically. Every mining company in North America, and even the world, had to have something going in Nevada. Whether it was any good or not, they had to have some claims in Nevada. So it was a tremendous effort, and it ended up with a lot of discoveries.

So that took care of a lot that was on the surface. Now, they are headed back underground?

Yes.

Tell me a little bit more about the Arthur Brant chair at the Mackay School of Mines and what you're hoping will come of that.

Well, Newmont had a very strong geophysical department, headed up by Arthur Brant. He was a remarkable man. Mining geophysics, which was very active after the war, particularly in Canada when they were making all these discoveries, went into a decline, and universities like University of Arizona, University of Utah, University of California, Berkeley, dropped their mining geophysics courses. It was at a very low ebb and still is. My idea was to fill that gap with a center of excellence at the Mackay School of Mines to kind of revive the exploration geophysics and to develop new techniques, particularly for penetrating deeper below these alluvial coverings. One idea is to use bore holes, put instruments down into bore holes and measure the physical qualities, hopefully. That was my idea. It took a long time to get started, but Jim Taranik is starting on that, and I think it will be developed. He is very interested in remote sensing. That's a little different field, which I think is coming, so he's emphasizing that more and more. I think that will be useful in exploration.

Could you describe remote sensing for me?

The original start of the airborne geophysics, which was started in Canada, was at fairly low level, anywhere from five hundred feet to a few thousand feet. Now, remote sensing is from extremely high elevations, looking from satellites, satellite photos, so it's a whole different science. Most of that is not using the same electrical methods that you could use at lower elevations—too far away. This is mostly all visual. They'd have these very sophisticated, modern sensing techniques by measuring spectral reflectance of the rocks, even from miles up there. It's amazing. They can determine a lot about the nature of the rocks; they could actually identify the rocks on the moon before they even got there. So you can determine a lot.

Of course, as far as finding an ore body—which is a dot, actually, a pinprick—it hasn't quite reached that point, but you can look for the setting for ore bodies, the right rocks, or you can see the big structural effects, and you can electronically massage these images. You see different colors. With color filters you can bring up colors—green, red, and blue—and bring out certain features. So it's a fascinating science which is developing. Jim Taranik is one of the leaders in that field.

But that is not going to be effective in finding some of these ore bodies that are deep underground. They might set up the area to work, but then you go back to prospecting?



Jim Taranik

Yes. That's right. They set up the favorable areas. I think it's a measure of the surface effect, pretty much, but I don't think they've reached the point where they can do any sort of penetration, so it's kind of in its infancy, I think, and if they keep refining it, it has a lot of potential. It's used for all kinds of other purposes, agriculture and everything else. I don't know of an ore body that's actually been found by that yet, but I think there will be in time.

You mentioned the bore holes with the instruments in them. Could you describe that a little bit more?

Well, Newmont did that. I think that's an unexplored field that the mining industry has not taken advantage of. They'll be drilling thousands of holes—you know how many holes have been drilled here in Nevada—but we don't take advantage of the information that can be gained. They have these instruments, and you can measure all kinds of things. You can measure conductivity; you can measure gamma rays; you can measure magnetics. All have a certain importance. To measure those physical properties they can penetrate a certain distance, and if there is a highly conductive body nearby you might be able to detect the presence of that.

The other thing is a new field which is called tomography, which the oil people have used. You don't just have one hole, but you take a whole series of holes, and there's where the computer comes in. You combine in a very complicated way all the information on, maybe, six holes, which gives you a real neat picture of depth that you never could get. I think that's a tremendous field there, but in mining it's very new. The mining industry hasn't got started on that too much, but that's some of the work that I hope the Brant Chair will do.

What kind of depths are we talking about?

Well, there's no limit to them, actually. They're looking at these ore bodies here in Nevada that are down two thousand feet. However deep the hole is, you can scan the hole, and you can measure the metals in there. You can now analyze the metals. You can do all kinds of things. See, the oil people do that. They drill one hole, which is terribly expensive, and it goes maybe to fifteen thousand feet, but then they put all these instruments down the hole, and they just milk all kinds of information out of that one hole. Trouble is, in mining we drill a whole bunch of holes, and they're not nearly as costly. It's harder to justify putting all that into a two or three-hundred-foot hole. They can justify it, but it's harder for mining. They did it on uranium; that was where it was used with the Geiger counter. All the uranium exploration nowadays, every single hole they would probe. They had a whole set up for that, people who would simply be measuring the radiation, and that would be a very simple way of determining whether there was uranium down there. So that was used very effectively during the uranium boom, but it hasn't been applied for gold and other metals so well. I think there's a tremendous field there in the future.

Just in mentioning Mackay School of Mines, can you give a little perspective? When you first came here in the 1940s, you were at Stanford. What was the role Mackay School of Mines was playing in terms of research, technology, any innovations?

It was, frankly, quite low, I think. Mackay School of Mines has improved tremendously since I first came to Nevada. They had some good people out there. They were doing mapping, you know, just mapping large areas. It seems sort of pedestrian to some people, but

it's a very important part of geology—just map the rocks. But as far as research, I don't think there was much. You have to distinguish between the Mackay School of Mines and the Nevada Bureau of Mines. The Bureau of Mines, really, was doing more research than the Mackay School of Mines. They have a very fine department there. Jon Price is a very good man. I'm very impressed. They put out all these maps and reports and have done very good work over the years, so they were doing research. I wouldn't say it was esoteric research; it was just sort of collecting information, very good quality. The actual geological department and metallurgical department at the Mackay School of Mines were doing a good job of educating students. They had their research projects, but it was very basic research, sort of academic, not necessarily applied to mining, that I was particularly aware of. They had good professors out there, but they often were not in the mining field, at all. They were like seismologists, or there would be a structural geologist, or they were dealing in other fields that they advanced in the science. What I could never understand was why there wasn't a program to study these Carlin deposits, which had been producing millions and millions of dollars for the state. That never was done until very recently. So there's been a tremendous improvement, I think, in the quality of the work out at the Mackay School of Mines.

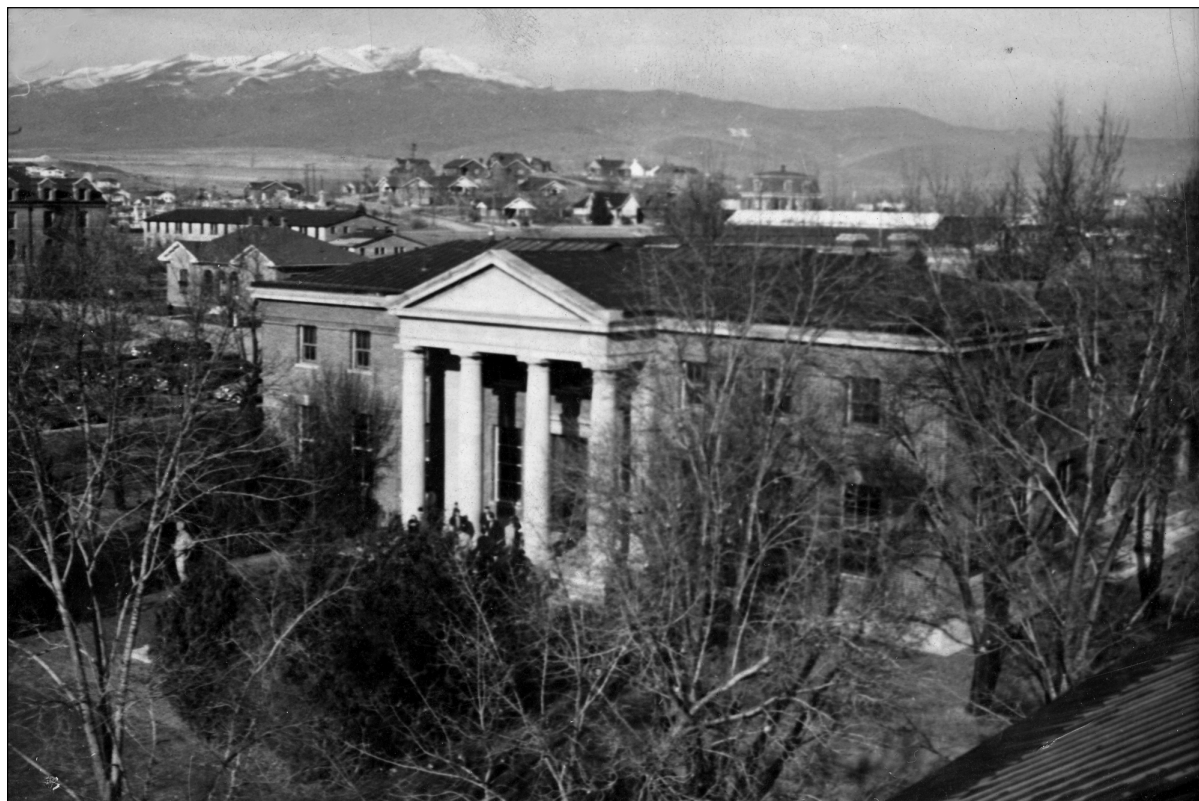
I was curious about that, because when I talked to some of the people who went to Mackay School of Mines and then went out in the field in the 1930s, they didn't mention any innovations that they learned at the school. They saw innovations when they were out in the mining, milling process. So it seemed more like the innovations were being made out in the field, at least here in Nevada.

Yes. That's it. For instance, Newmont had quite a strong research department in geophysics. In fact, Mackay School of Mines didn't really have much going in geophysics. They have had a geophysical professor, but as far as research in mining geophysics, it was at very low ebb, I think.

Would you say that most of the innovations have been coming into Nevada, or coming from Nevada and going out into the world? Can you think of some examples of that?

You remember Jim Hendrix, the former dean? He was doing a lot of innovative work on cyanide treatment, and that was important. That was coming out of the university. Of course, I wasn't that familiar with the school, like I am now. I think a lot of stuff going on out there I probably wasn't even aware of, other than some of the work that he did.

I don't know of anything other than the U. S. Bureau of Mines that was doing more practical research. They were doing technical transfer. When they got into the deeper ores they ran into this carbonaceous ore, and that was not treatable by the normal methods. They had to develop a whole new method. The Bureau of Mines developed this carbon method, which actually wasn't new, because it had been used by Frank McQuiston. The Getchell had had the same problems, and they actually developed this carbon method back in the 1930s at the Getchell Mine, but it was not used there. They didn't put it into practice. They knew there was an affinity between gold and carbon, but the U. S. Bureau of Mines translated that into practical applications, so that these carbonaceous ores could be treated. Of course, that opened up a tremendous possibility, because of enormous reserves of this carbonaceous ore that could not be treated



Mackay School of Mines, 1941.

under the straight, standard cyanide methods.

A lot of the innovations came out of South Africa, because they were very active in the gold business, and they had a very strong research organization down there—much better organized than we have in this country where the industry and the government cooperate. They have what they call the Chamber of Mines down there. We've always had a difficulty of industry working with government in this country; we seem to always be at loggerheads. It's unfortunate. But they work very closely together, and, of course, it's a tremendously important part of the South African economy. The first carbon plant, actually, was installed in South Africa, but the first one installed in Nevada was our Pinson Mine—the first commercial application of carbon and pulp in 1981.

What is the problem in terms of getting the ore out of the carbonaceous material?

Well, in nature the so-called activated carbon has a very strong affinity for gold and silver, and there's a very tight bond. It's not completely understood, I think. [laughter] It's an adsorption. The carbon has a lot of surface area, and the gold in ionic form, presumably, attaches to this. That's a very hard bond to break. When you have that ore the cyanide solution doesn't affect it at all, so you have to break that bond. There are a lot of good ways of breaking that bond. Of course in a normal state, when the ore gets oxidized on the surface, then that bond is broken; the carbon is destroyed. So you have to destroy the carbon somehow or other, and, of course, there are a lot of ways of doing that. The first method they have is using chlorine. That was what Newmont used. Then there's a simple way of roasting that destroys the carbon, and then you have a number of other methods, but then, of course, that same method is used to recover the gold, so it's used in both ways. Once you

get the gold in solution, and you want to concentrate that gold in solution, you can add carbon, and that will take the gold out of the solution. That's a means of concentrating it. So, where it was working against you in the primary ore, now in the processing it's working for you.

So the researchers had to think about it a couple different ways?

Yes. Right.

You mentioned something about government and industry working together—or working against each other, as the case may be. Maybe this is a time that we can talk a little bit about some of the things that you've seen over the years in that respect. Back when you were out prospecting in the Carlin area, what would you say was the relationship between the government and the mining industry then?

Well, one thing is that there's always been a close relationship with the U. S. Geological Survey—Ralph Roberts had a lot to do with it—and that is true in the past, because the U. S. Geological Survey, while they were doing basic mapping, used to come in. That was one thing that didn't happen at Carlin. What used to happen in the old days was when the district was discovered, the U. S. Geological Survey would come in and do a tremendously detailed map of that area and produce a beautiful report. Now, that normally would have been done, maybe, starting in the 1960s out at Carlin, and they would have had a beautiful map, but they didn't do it, because the funding changed in the survey. These are long-range programs. You know how the government budgets are—you have to see something coming out of the work within a year or two. The idea of working on a project where you might not see the results for five or six years does not fit, so that type of work, unfortunately,

didn't exist at Carlin. There were various professors from Stanford and USGS getting up and doing a certain amount of surveys, but nobody put it all together. The industries, different companies, were doing their area, and other industries were doing their area. Nobody put it all together. The USGS wasn't going to do it. Then you would have thought the State Bureau of Mines would have done it. They didn't do it, either. So now, finally, with this CREG, it's being done. Tommy Thompson is doing a very fine job.

Now, this is a case that's very interesting to me, because I went to Stanford, and I worked for the oil industry for a short time, but I decided I liked the hard-rock mining better. They have all kinds of programs at Stanford—research programs where a whole group of oil companies get together, maybe ten oil companies, and they subsidize these programs year after year after year. That never existed in mining. The mining companies were not good at doing that—working together. Now this CREG is almost kind of a first. That's the Ralph J. Roberts Center for Research in Economic Geology. It's part of the Department of Geological Sciences at the Mackay School of Mines at the University of Nevada, Reno. It is run by Tommy Thompson, and they are studying the basics of the Carlin-type deposits. A consortium of mining companies is pooling money to support this research. That is a type of thing that should be done more often.

Do you know which companies are supporting that?

Most of the major companies, and I am one of the supporters myself, but you'd have to get that from Tommy Thompson. There are about fifteen companies. Now, of course, they are worried about the price of gold going down, and maybe two or three of them have dropped out, but they're still continuing. That's a very good program, so it was great to get that going.

So that's an instance where the connection between government and industry has developed and gotten stronger over the years?

Yes, I think that maybe the mining industry is becoming more open on that. The mining industry was very conservative, and they were guarding their secrets very carefully. They didn't want the other person to know about their secrets. [laughter]

Very competitive?

Very competitive. The oil industry had a different theory. When you're picking up ground, of course, then that's terribly competitive. When they all have their ground picked up, and they can't steal from anybody else, then they share information. They have what they call these core parties. They all lay out their core and let everybody look at it, but the mining industry has never done that.

They're starting to do it a little better. Newmont was one of the few companies I remember that used to share information with other companies, because we figured we'd get as much back, kind of even exchange, so I hope that there will be more of this in the future.

Any other connections with government, such as county, state, or BLM, that you were aware of when you were out prospecting around the Carlin area?

Well the other thing, as I mentioned earlier, was the U. S. Bureau of Mines. They had always been oriented to and helpful to the industry, so that's been going on for years, actually. They've been doing research on coal and hard-rock mining, so that has worked fairly well.

Was it U. S. Bureau of Mines that Ralph Roberts was working for, mapping?

No, he was with the U. S. Geological Survey. The Bureau of Mines—they concentrate on metallurgical work and safety. They used to be in safety, but it's mostly metallurgy, and the U. S. Geological Survey is certainly the geology.

I'm sort of the maverick in industry, I think, because I state these things. I just have feelings about it. Industry has the feeling that they don't want the government to be encroaching on them, and the U. S. Geological Survey got too close to the exploration. They started drilling holes or finding ore bodies. [laughter] That was not their business, you see.

There again, sometimes you get the government to take on the risk of drilling a very deep hole, for instance, that a mining company couldn't justify. Well, that would be in everybody's interest, but there was always that problem—they don't want competition. You can do the basic esoteric research, but don't get into anything close to what we're doing. That may be changing a little bit, too.

So in the 1960s, mining had stronger connections to the U. S. Geological Survey and the U. S. Bureau of Mines then, say, to the BLM or any of the other government agencies.

They weren't in it at all. Oh, that's changed a lot. The BLM didn't even have any geologists from the 1960s. No, that's true. They've gotten into it quite a bit, but I wouldn't say the work they're doing is helping the mining industry much; it's more for land management and that sort of thing, and sort of superficial studies which are important for land-use planning, but I don't think they're doing basic geological work. It would be the U. S. Geological Survey that would be doing that.

That's interesting. I was just out last week at a small one-man operation outside of Gardnerville. His viewpoint is that the BLM

is, in fact, working against the small individual miner.

Oh, I have no question about that.

Lots of rules and regulations that make life miserable?

They're just too costly. They have just practically wiped out the small miner. Yes. You can say it's the BLM, but, of course, it's really Washington that passes these regulations, and the BLM has to carry them out. Well, it's just like the small individual in everything. Small rancher, small farmer, small miner, small banks—they're all struggling, yes. It's too bad really.

What about environmental regulations? That's another thing that's changed over the years. Would you describe yourself as a maverick in that area, too?

Oh, yes. You know about this *High Country News*? That's a very interesting publication. It's kind of environmentally oriented, but it has some awfully good information. I know the editor. He was doing a mining issue, which was not too bad; it was somewhat balanced. He called one time and said, "John, I'm writing this mining issue." He, after all, is an intelligent person. He's been editing the thing, and he says, "Has the mining industry really changed in the last ten years?" I mean, the mining industry has absolutely been completely revolutionized in the last ten years, because of all these controls, but they can be over done. Do you know that when we built the Pinson Mine we didn't have to get any permits? None at all. That was 1980. One, because the FLPMA Act [Federal Land Policy And Management Act of 1976], which established all this, didn't go into effect until 1981. A lot of it is on private land, but a lot of it is on BLM land. We didn't have to get any permits from the BLM. We had to

get a county use permit. After we built the mill, then the law came into effect, so we had to go ahead and file a Plan of Operation, but we were already in operation.

That's so different. When I was interviewing down in Silver Peak, it was while they were in the permitting process, before they could start. They'd been in the process for months, and their start date kept getting delayed, because somebody was on vacation in the BLM, or whatever, so they were going through a tremendous process. They had about twenty permits. They had a list on the board and a flow sheet of where they were in the process. It was amazing.

Oh, yes, and people don't understand. You hear so many people say, "Well, the miners are doing anything they please on the public land." That's just absolutely ridiculous.

Right. They're not able to do anything they please. They're being watched very carefully, it sounds like.

Very carefully. Yes.

I was talking to a young woman, who knows some things about what's going on now, and she said that there is, in fact, some new legislation being introduced that would limit what people could do with their own claims on BLM land. She said that right now, as long as you follow these rules, you can develop your claims, but the new legislation is going to say whether you can or you can't, no matter what you do. Are you aware of that?

Of course, that's what they always say about the 1872 Mining Law. The land managers say that the trouble with the 1872 Mining Law is that a government agency cannot prevent you from mining. Techni-

cally speaking, that's true, but they can put all kinds of restrictions on, which, in effect, make it impossible to mine. But they can't just deny a permit under the 1872 Mining Law.

That's why the industry is so adamant about keeping that law?

Right. It's that exactly. I think a lot of people in industry, including myself, think that the law should be changed. It is just a question of how it should be changed. They're getting very strict on cutting back the mining claims, as people used to take advantage of the law. No question about it. People would build a cabin on a mining claim and really not do any mining, and that wasn't correct. Now they're getting very tough about that. You have to prove you have a valid discovery. They used to use the old rule that if a prudent man—that is an interesting phrase they use, "a prudent man"—would work on the property, then he could stay on it. Well, of course, that's hard to define, because a prudent man, you know, might not have a very good sense of economics. He might want to dig on something that really isn't worth digging on, but as long as he decided it was good to dig on it, he could do that. Now you have to prove that that could be mined at a profit, you see. It's a whole different standard they're using, if you want to hold your claim, so that makes it very difficult for a lot of these people, who have had claims for years and years, and they're scratching away at them and trying to make something out of it, but they don't have a valid ore deposit yet. So that's a big change.

Then, of course, they've increased the fees, and that makes it very onerous, again, for the small claim owners, so a lot these small claim owners just have to abandon their claims. They can't afford to keep them anymore.

You describe yourself as a maverick when it comes to environmental issues. Can you explain in what way you are a maverick?

Well, I hope I can see both sides of the question, to a certain extent. I've been all my life in mining, so nobody can call me a pure environmentalist, I think. [laughter] But look at my own history and my family's history. My mother was a very active environmentalist, and my brother is active—he was a lawyer for the Audubon Society—so we have a history of environmental activity. I think I can see an environmental viewpoint myself. I like to think that I can take a more balanced position, and, of course, a lot of the work we do in this Public Resource Associates—I mean, they think this is an environmental organization. Of course, Susan Lynn is doing several projects, like saving Walker Lake, which I'm supporting, but I like to think I can take up some of the middle position on these issues, which is very difficult, because most people—you're either on one side or the other. [laughter]

Right, they can't see you as having a middle position.

Yes, that's right. That's why I've felt that the mining law is definitely an anachronism; it should be changed, but the industry is very reluctant to. They're afraid if you make any change, it will open a Pandora's box, and then we will get very, very strict controls, so that's where the battle is. Environmentalists want more controls, so there has to be kind of a midpoint, and it's very hard to arrive at that, so it doesn't shut down the industry. Of course, a lot of people, they want to shut down the industry. It's as simple as that. They want to shut down all resources on public land—logging, ranching—and they don't always come out and say that. I think, for instance, with logging and the Forest

Service, it looks to me like they are eventually just going to ban logging on all national forests.

So, anyway, that's one extreme, but you have extremists on both sides. We tried to work out some compromise on the mining law ourselves, and we worked very hard on that, actually. I don't know whether you are familiar with that. My brother and I got some environmentalists together with industry, and we had a little dialogue group going. We picked—not the extreme environmentalists—more moderates and the more moderate industry people, and we really came to a meeting of the minds on quite a few issues. The toughest one is the land use, because how do you define land use? And how do you decide in an area what resource is the most important? Is it the mining, or is it the scenic value? Is it the recreation value? Those are very tough decisions to make. I was really hopeful that we could come up with some consensus legislation. We had an office in Washington and worked with some of the legislators, but it didn't work, and I have to say, frankly, because the industry wasn't really willing to compromise. They may have to eventually, but they had a rigid position, and so far it has turned out to be correct, because the law hasn't been changed. So their position is only to accept very, very minor changes in the law.

And that position has not changed in spite of your work with dialogue groups?

No, that hasn't really changed. Of course, now we have a Republican-controlled Congress. So it's a complete stalemate, and if we ever get a Democratic Congress, then there will be changes, I think. That's what we've always told the industry, that if you don't agree to some changes now, you're going to have a lot worse changes later. It's a little bit hard to sell them on that, though.

So, all of this work is at a national level. What do you see at the state level, here in Nevada, in terms of government and industry cooperation?

Well, we haven't had that much of a problem here. When we started up the Pinson Mine, there were no reclamation requirements at all on BLM land. We were doing our reclamation voluntarily, because we thought it was important to do. This is one thing where industry at the state level, I think, really took a good approach, because I think industry realized reclamation was required, and it was going to come, so we might as well get in the process. So industry got in with the environmentalists. Glenn Miller from the university was very active. They came up with a law, which is quite a strict law, which controls reclamation. The industry agreed to it and is carrying it all out, and that was a good case of compromise, and that's the way you'd like to see it work on the federal level, but it hasn't so far. On a state level, the industry objects to some state regulations, and the Environmental Protection Agency, which in Nevada didn't even exist in 1981, has a tremendous bureaucracy down there. They are doing a good job. Everybody complains about controls, but on the state level it's going pretty well, I think. The industry has been able to work with the state pretty well. In Nevada, because it's such a strong mining state, I think the state bureaucracy realized that they have to deal with industry. They don't want to shut down the mining industry, so it's worked pretty well on the state level.

So, it's a little better in Nevada at the state level, than you are seeing at the national?

Yes, much better. Of course, on the national level you have only people in the East. They don't care anything about mining. They don't know anything about mining, at all.

When you were here working on the Carlin trend, you were here just for a short period of time, working with Alan?

Well, yes, I was here. I came back in 1960. I had been, actually, in Morocco at that time on a project that was terminating. A project came up in Eureka, Nevada, which Newmont was involved in, a joint venture with three other companies. I was assigned to this project to manage a deep drilling project. It was kind of an interesting project, because we drilled some very deep holes to prove up this ore body out there in Eureka, and that went on for about seven or eight months. Then, when this Ralph Roberts map came out, the Newmont people got together and decided to pursue this idea of prospecting the Roberts Mountains thrust. Since I was there anyway, and that drilling job had been finished, well, I was sort of the logical person to put in charge of that, and Alan Coope, who had been just recently hired by Newmont as a young geologist, was sent to join me as my assistant. So that's how that developed.

Alan Coope is from England. He had worked in Africa and several other places, but he was new to the United States. One of the things about Alan Coope is that he had a very strong geochemical background. He had a very fine course in geochemistry in the London School of Mines, so he was very up on all these trace elements. We simply started out prospecting the Roberts Mountains thrust. It was as simple as that. It extends for a long distance up through the country. We started in Eureka, which is where we were based, and we soon developed ideas on how the gold was occurring in association with other elements. Alan was good on that. We knew that there was an association of mercury and antimony and arsenic and that sort of thing—just by doing a lot of sampling. Of course, we finally decided that, although we knew there were the so-called trace elements associated with

gold, if you're looking for gold, the simplest thing is to analyze for gold. [laughter]

Luckily, we had this Harry Treweek over in the Crescent Valley. He was a very good assayer. You had been talking about atomic absorption. The fire assay is still the best method to look for gold, but it's not as sensitive, so the average assayer cannot get down to the levels we were looking at. We wanted to know if there was *any* trace of gold in the rock, and most labs that you would send the sample to, they really couldn't assay it. It would be .01 or .02 ounces per ton. Well, no matter what you sent in they would give you a .01 or .02 ounces per ton, because they weren't that sensitive. But when Harry said we had .005 ounces of gold, we were confident that it was really there.

Was he doing that by fire assay?

By fire assay. You can measure, actually, down to .005 ounces of gold, if you're very, very careful. So that was very helpful to us, because there were no other labs around. There were no assay labs in Nevada at that time. There was absolutely nothing going on then. I think there was a lab down in Carson City. There was not an assay lab in Reno. Isn't that amazing?

So, you know, they used to say at that time, "Well, they were very secretive—Livermore and Coope—very secretive. They're taking the assays fifty miles away so we won't know about it." Well, that was the only lab around. [laughter]

It wasn't about secretive, it was about necessity?

That's right, and then they said we were going after it at night, sneaking around at night. Well, we had no competition; there was nobody around there. [laughter]

It's interesting how you've got some myths that have already built up around your operations. Was there an element of secrecy in what you were doing?

Not at the time, although we found out later that Pete Galli, who became my partner, was with another company, and he sort of knew what we were doing out there. I think he told me afterwards that he was kind of following us, but there was very little gold exploration, because of what I told you earlier. The economics weren't right at that time. In fact, it was really kind of surprising that we got on this gold at all, even Newmont, because most of the mines that were operating were fairly small, and they weren't making too much money at that point, but I had the confidence that we might get a mine that could be mined cheaply by open pit. There was the Getchell. There was the Goldacres. My idea was that, well, none of those are really quite big enough for Newmont, but if we're lucky enough we might find two or three of those together that would feed one mill, and it would be low cost, so on that basis we decided to go out. Well, of course, it turned out we had found something that was four times as good as any of those, so that was a big surprise. [laughter]

It was beyond what you had hoped for?

Way beyond—because this was four or five times as good as any of those others. So it turned out that that deposit, even at thirty-five-dollar gold, was quite profitable. Sometimes in exploration you hear about a "technical discovery." You have a geological idea, and you find just what you're looking for, but it's not economic. You don't get much credit for those.

As you were going through the prospecting, at what point did you realize what you had?

Well, we didn't really realize until we'd done some drilling, actually, because we were getting gold from these different areas—just very low values. We went up into the Lynn Window, and there were two or three little, small showings of gold up there—the Bootstrap and the Blue Star—so we knew there was gold there. In fact, there were two or three gold areas. I thought this was an area that we should be concentrating on, and then we actually started getting some values there on Popovich Hill, which were, again, low values, but there were a lot of them scattered around a big area. That's what we'd been looking for. They were right in the right spot where they should be. They

were in or close to the Roberts Mountains thrust. Now, if we had found those values somewhere else, we wouldn't have paid much attention, but they were right in the spot we were looking for, and they were scattered over a big area, and the rocks were right. So that decided us. This was the most interesting thing we'd found. We'd found scattered values all around, but not big enough. I've mentioned this story many times about bringing Fred Searls and Bob Fulton out there. They were looking over this hill—it's getting kind of dusk—and they saw the samples. It was pretty obvious they weren't very excited. Fred Searls says, "Well, John, if you want to go ahead and stake those



"We went up into the Lynn Window, and there were two or three little, small showings of gold up there—the Bootstrap and the Blue Star—so we knew there was gold there." Aerial view of the Bootstrap Mine.

claims, go ahead and stake them. It's all right." [laughter]

But he didn't really believe that you had found anything?

No, but it wasn't until later work was done. The first work we did was put in about four or five bulldozer trenches. Again, very low values, but we had one stretch in one of those trenches where we actually had about forty feet of material that theoretically could be mined. That's really what started everything. That's when I left to come up to Canada. Then they started drilling this, and they just immediately started running into high grade, so it was very simple. They just started drilling the whole thing out.

So you had just barely located it, and then you were off to Canada?

Canada. That's right. So I wasn't involved in the follow up. Bob Fulton, who was in New York at that time and wasn't involved in the field work, took over the project, and he got Pete Loncar out there. Pete is a great guy. Of course, Bob was the one that was really responsible for developing the mine, putting it into production, and he did a great job on that.

I've talked to Pete. I went to Montrose and visited with him. He described all the drilling that they did and the work they did.

But the amazing thing about it is that we had this idea. Of course, there's the luck of the game. I *know* I've been very lucky. In this business there's a certain amount of skill in it, but there's an awful lot of luck. It was the first project that we tackled. You might ordinarily say we had several. We'd drill three or four projects and maybe the fifth or sixth or seventh or eighth would hit. We hit it right on the first project. [laughter] The first property we ever drilled was the

Carlin ore body, and it this whole process only took about three or four months, from the time we first started on this until we had those bulldozer trenches, so it was kind of a miraculous thing, really. It was just so, so lucky.

How many geologists spend a lifetime and don't come across anything near what you did?

Oh, lots of them. Yes. That's the luck part. [laughter]

But you also had this idea about the disseminated gold. That had kind of stuck with you.

Yes, and we found exactly what we were looking for, except it was much bigger than we ever thought it would be. We thought that because it was fine gold it might be right on the surface, that it could be mined by open pit that the old timers had missed. If it was going to be a vein type occurrence, we wouldn't have even bothered, because at that time you couldn't mine those narrow veins. So the theory was correct, and it just happened to work out.

So, Bob Fulton did come out with Fred Searls then, and you did some work with Bob Fulton?

I was actually working for Fred Searls at that time. Actually, on the Eureka project I wasn't even working for Fred Searls; I was working for another company. There were three companies in the joint venture, and Cyprus was actually the operator, so you might say I was loaned to Cyprus. I was actually reporting to a fellow named Bob Hendricks. When that terminated I got back on as a roving geologist, and I looked at, actually, quite a few other properties. I was reporting to Fred Searls at that time. Bob

Fulton was involved in it a lot, but my correspondence was always with Fred Searls.

Harry Treweek was using the fire assay. Was the atomic absorption process available at that time?

No, that was developed sometime in the late 1960s. When I came back in 1970, that's what we used then. No, the only method was fire assay. Atomic absorption doesn't give you all the gold, but the fire assay is still the best method to determine the total gold, because you melt the rock, so every bit of gold comes out of it. Now, for instance, in a carbonaceous ore, the atomic absorption will not give you the gold, because the gold is locked in the carbon. You have to roast it first, so fire assay is still used. Of course, it's been going for two thousand years, I guess, something like that. Nobody has figured out a better way to do it. The only problem is the sensitivity. Now, of course, they have a method, which is neutron activation, that gets down to extremely low values. They can measure parts per-billion, which is used now sometimes where you want extremely accurate analysis of gold, but that's a very expensive process. It's not used for common assays.

So it was pure luck that you found within three months exactly what you looking for? It was also pure luck that you had such an excellent assayer right nearby?

Well, that's right, because otherwise it would have been very hard to know if these low assays were meaningful, which we had to know, because we were just looking for, literally, what were then considered trace amounts. That's what we wanted to find out. If there was a trace of gold, we wanted to know about that. So that was very helpful, having that lab over there, yes.

When you were out there doing the bulldozer trenches and so on, was there any question about the aesthetics or the erosion or any of the environmental issues at that time?

No.

Looking back would you consider that something that was OK to do?

No. I think I said that many times, that the things we did then, we would not do today, no.

And is that one of them, the bulldozer trenches?

Well, yes. You see, the one problem is that the best prospecting tool in Nevada is the bulldozer, because you think of Nevada as having a high percentage of outcrops, but actually that's not true, because there's often a cover, and you can see the particles floating where the rocks are, but to get the real detailed look at the rocks just from geology, to see what the dip of the bedding is and to work out the stratigraphy—there's nothing like a bulldozer trench where it's actually exposing a continuous outcrop of rock. So it's a very valuable tool. Now, of course, in those days we never thought of filling the trenches back up. That wasn't considered. We didn't do much of this, but the worst thing that was done, I think, is where they would take a bulldozer up on the top of the ridge and just ride down the ridge, and make a *terrible* cut, just terrible eyesore. You can't obliterate that. They don't do that anymore, but that was very bad. We didn't do that in those days. We were mostly digging on flat areas, but no, that was just a tool we had, and we just never thought that there was any need to fill it back in again.

So today, the solution would be to fill it back in, because you said bulldozer trenches are

still the best way to check this out. Are there other solutions?

Well, that's one of the problems, of course. It has to be done, I think, although you can argue that in some cases you shouldn't fill them back in, because it's a very valuable resource. Say the first person fills in the trench. Someone comes along ten years later trying to analyze the geology. Having a trench there is tremendously valuable, but now you don't have that value anymore. Of course, the same is true of all these old workings that they're filling in. You're destroying a lot of information there. I think that, rather than filling a shaft with dirt, they are much better off to cover it over, so that you can actually get back down in it. See, a lot of our prospecting was done just that way. We came up with a lot of interesting things, just going back to these hundreds and hundreds of old workings. We found two or three deposits that way. So, that's a resource that is, unfortunately, being gradually destroyed.

So, if somebody wanted to check those areas again, they'd have to start all over?

Start all over again.

That's the method right now, to fill those shafts for safety reasons?

Everything has to be obliterated. The roads and everything have to be returned as close as possible back to what it was originally. Well, I can see the point of it, I think. There again it's hard to decide. The simplest is that they have to fill everything in. If you go back and say maybe this should be preserved for various reason, who's going to make that decision? Hard for the BLM to make that decision, filling all the roads back in again. Anyway, I think the simplest thing is just obliterate everything. [laughter]

But in terms of prospecting, that's information lost?

Oh, a lot of information lost. Yes, very definitely.

Yes, all of the old mine shafts and everything.

Yes. Of course, now they have a big program, trying to raise a lot of money to do all this reclamation. Of course, the other interesting thing is the historical aspect of it. People in many ways don't like to see those dumps obliterated, because they like to dig around in them. You ever hear the famous case of the Malakoff Diggings, that park down there by Nevada city? It's an old hydraulic pit. Anyway, by most standards it would just be one of the worst examples of hydraulic damage, just a terrible eyesore, but there was a mining company that came in there. They were going to reopen part of it. They said, "OK, we'll put our tailings back in this pit, cover the whole thing up, plant it all over."

"Oh, no, you can't do that. It's historic." [laughter]

So you run into the historical question. Even the forest service and some of these agencies, you know, some of these old dumps, they don't allow you to move them. So I don't know how you reconcile the reclamation against the history. You know, we should have some evidence. Do you want to completely obliterate every evidence of mining in this period of time?

It's very complicated, isn't it, with all the different interests involved?

Very complicated. It really is, yes.

And there was not this complexity in the 1960s when you were here. There wasn't the gold mining going on, just a few small

operations, because the overhead was so high, and the price was still low, and there wasn't a lot of competition. There weren't a lot of prospectors for various companies out looking. So it was a completely different atmosphere from what it is today.

Absolutely, yes, and there weren't as many people around on the public land, of course—that's the biggest difference. Particularly in northern Nevada, the population was so low that there weren't people out on the land observing what the miners were doing, complaining about them. So that was that feature, and everybody had a favorable impression of mining then. That, of course, completely changed. Even Las Vegas people in those days, who didn't know anything about mining—you talked to the average person in Las Vegas and their impression of mining was favorable. Now it's completely changed.

Do you hear that impression of mining? I mean, that must have quite an impact on people.

Yes, it does. Of course, that is what I've been doing all my life, and now they're saying, "That is just terrible." [laughter]

That must be very strange. I mean, you've won some major awards for the work that you've done. You've been all over the world.

Well, it is. Times change, I guess. Of course, when I went into mining, it was a very prestigious field. You had a chance to travel all over the world. Some of the mining engineers are very well-known people, like Herbert Hoover, but it's a different situation now. I can understand it, except that the mining has gotten a pretty raw deal about the whole thing, because the media has been so much against mining and published articles that are factually incorrect and has made it an emotional issue. Once you get it

into an emotional issue, it's a very difficult thing to combat. That's certainly the problem at the Mackay School of Mines, I'm sure, attracting people into mining engineering.

It's affecting the recruiting?

Oh, absolutely.

You are having a hard time getting young people to go into the business?

In the mining engineering, not geology. Geology doesn't get tainted in the same way, because I think people have respect for geologists, even though they were responsible for some of this. Of course, some of the worst damage, you might say, is really done in the exploration, because you have to build roads. They are an eyesore from the purists' point of view. So a lot of the exploration that's been going on is damaging from the point of view of visual effects. They are trying to reduce that a lot now. I think industry has helped on that, and we had something to do with introducing drills on track. You have these drills mounted on track, and you don't have to build roads anymore.

They can go right over the sagebrush?

Right over the sagebrush, and there really is very little environmental damage. Well, that is a big development.

So, that's interesting that so much of the damage, you said, is caused by the exploration stage. Yet, geologists have maintained their reputations somehow, while mining in general hasn't. That's almost a contradiction, isn't it?

Yes, it is kind of a contradiction.

Do you think it was open pit mining that started causing that damage to mining's reputation?

Well, I think these enormous pits cause enormous destruction. You know Elizabeth Raymond? She's writing a book with Peter Goin, and it's a very interesting book, because he is showing how mining changes the topography. I mean, enormous mountains have been destroyed, and it's the size and scope of the operation that I think bothers a lot of people. The underground mining really has a very limited effect on the environment. So that's part of it. These big open pits and these enormous heap-leaching operations, yes, that's a big part of the problem.

Well, a big problem is the pit itself. You've got a big hole there, and environmentalists say you should fill those pits back in. Well, of course, it simply isn't economically feasible. It would cost billions of dollars to fill those holes up. Is it really in the best interest of our society to do that? So that's the biggest bone of contention. Of course, all those pits will end up as lakes and can be used for recreation. This one now they're filling up—they think it might be developing quite a good fishery. So it's not all negative, but the average attitude that so many people have, and certainly the strong environmentalists have, is that everything man does is ugly; everything that nature does is beautiful. It's just kind of ridiculous. What about the Grand Canyon? I mean, God, look what a mess nature made of the Grand Canyon. Talk about a big open pit. [laughter] But that's the attitude, yes, and you can't get around that. Anything that man does is disturbing nature. Then, the best you can do is return things back, and that's kind of ridiculous, because sometimes these mines can improve something. Like, there's the big gold mine in Nevada; they built a nice lake up there, and they have wetlands. It was just a barren desert. But, you see, the purists don't agree. It couldn't be better than it was before. There's no way you can improve on nature.

It's interesting, because Mother Nature does her fair share of damage, too. We've just had 105-mile-an-hour winds in Reno. That did a fair amount of damage, you know.

It's hard to combat that attitude, and it's just a sort of perception. I always think that it's how you look at things, and, particularly, if you look at things in an entirely different way. Did I ever tell you of that woman from Harvard School of Design, Martha Schwartz? She was interested in reclamation. She came out and looked at our Pinson pit, which is a big hole like all the others, but they had some very interesting formations, bedded formations, all colors and textures. Geologically, it's beautiful. I think it's beautiful. Anyway, most people say it's just a horrible, open hole, but she came out and looked at it, and she's an artist. She said, "That's beautiful." It's all in the way you look at it.

It's very striking. The pit, as you say, all of the different colors, textures, and so on—it's amazing.

For me to take a student out there to understand geology—I mean, you have every kind of fault and fold and sediments—it's just a beautiful geological textbook right there in front of you.

Just opened right up for them to see.

Yes, which you never could see. Well, with the hills you can't see, particularly, the third dimension. You don't get the depth.

The depth. Yes, it's quite a contrast. I went up to the open pit mines in the Carlin area, and then went down underground. My only underground experience was going down in the Mickle Mine—a totally different experience for someone like me who doesn't have that background, at all. I have a new respect for people who can go underground,

because I don't think I breathed the whole time I was down there. [laughter] It was quite an experience, but I understand what you are saying about how striking it is as you come over the hill, and you see this big open pit and all the colors and textures.

And to see what man can do, actually. So I don't know. I often wonder if the pendulum is going to swing back a little bit. I don't know if it ever will. I think the mining industry is not taking quite as much of a beating as they were, maybe, two or three years ago. I think the media is easing up a little. I think they worked us over so much on some of the issues that the industry wanted to correct. They talk about this two and a half dollars an acre. Well, industry wants to change that. You can now buy patented land for two and half dollars an acre. Then they say that Barrick ended up with this billion-dollar ore body, and they only paid two and half dollars an acre for it. But the industry wants to change that. The industry has agreed to a royalty. So those are two of the biggest bones of contention—if those could be solved. What the industry wants to do is just solve those two and leave everything else unchanged. The environmentalists—of course, I can understand their point of view—don't want to, because that's where they make the most points in the media. If they eliminate those points, then it will be much harder to get what they want, and other alterations, particularly in the land use, so they are fighting against that. They want a more complete restructuring—that's what the big point of contention is—but they make an enormous issue out of things that, really, the mining companies have agreed to already.

You've watched the environmental movement go from grass roots back in the 1960s, 1970s, to a politically savvy movement at this point—trade offs and bargaining and so on.

Oh, they're very powerful, very powerful, but they haven't been able to win it yet over the mining industry. It's kind of interesting. The mining industry doesn't have that much political clout, but they've been able to withstand a major change in the law. Even when the Democrats were in power, they couldn't get it through.

The metals needed with the information age and computers and all of the things that we use, such as the cell phones—all of us have so much equipment.

I don't think the average person looks at that. In fact, the industry keeps harping on that. I don't think that's a good argument. I think people don't care, "Well, we'll get the metal from somewhere else. We'll get it from foreign countries."

Let it damage their country?

They say, "We'll get them somewhere." I don't think that's an argument, unfortunately, that works with the general public. I really don't think so. That's one thing—I think industry is not good at selling their story to the media. They emphasize things like that, which is true, but I think the biggest thing in industry is reclamation. I think that's what they should be selling. They still think that miners are making the most horrible mess. I think if you asked the average person, "What is your feeling about the mining industry?"

"They're making piles of money and just messing up the environment."

So if you can show the advantages of the reclamation, you think that's the strongest?

Yes, and that's why I think the university can help. You see, I've always wondered why the university doesn't have courses in reclamation. I think Jane Long, Dean of the Mackay School of Mines, is starting that now.

She has this new program of analyzing, not just engineering and metallurgy, but the whole training of students in permitting and post-mine closure.

I'm very interested in the post-mine use. What are these things going to look like when the mining is all finished? Some of the companies are doing that, but they should be doing more of that. In fact, Barrick is one of the few that actually hire a landscape architect to design their dumps and to end up with something that's a little more aesthetically pleasing, and figure out where some of these mines could be used for landfills. There's a big mine in California that's going to be filled right up with land fill, and there are other recreational uses, so it's not a complete loss. Of course, there's going to be an enormous lake out at Carlin. Tremendous lake. I forget how long it's going to be—miles long. Somehow or other, that could be put to recreational use.

There was open pit copper mining, but there was not open pit gold mining until Carlin Trend. Do you ever think in terms of that—that part of what you helped discover began some of these issues for the gold mining industry?

Well, I guess that's right, because of the scale. There were these little mines, Getchell and Goldfield and a couple down by Tonopah, sort of piddling mines, but there's nothing of the scale of these mines, equal in the scale of the open pit coppers. There's never been a gold mine, except maybe in Russia there's a big one, but they've never had open-pit gold mines even approaching the size of it. Carlin Trend is something new that started that, yes.

The other thing is heap leaching. Those piles cover large areas, but they could be pretty well restored, really. They can re-vegetate those areas, and the tailings can be re-vegetated; the dumps can be re-vegetated, but, of course, the hole is still there.

The hole in the ground is the big eyesore to most people.

That's the big eyesore, yes.

You mentioned heap leaching, that there was some work that was done on that process?

That was done right here at the U.S. Bureau of Mines. Well, heap leaching is nothing very complicated, really. Actually, it isn't that new, because people have used it in the copper business and leaching their dumps containing copper oxide. They simply distribute a solution and then use acid to leach out the copper and recover it—low-grade copper in dumps—but it was never applied to gold technology. It's simply a way of, instead of having to grind the ore very fine like flour in the mill, which is quite expensive, you could just dump the material on a great big pile. In Nevada, it's so ideally suited to this whole business, because it's a wonderful area to work in. The climate is ideal. Access is very good. You have wonderful geology, and you have these big, flat areas that are just perfect for heap leaching. [laughter] You couldn't design it better.

One of the problems in other countries, when they try to do heap leaching, they have mountainous areas, like in Central America, and there's no room for heap leaching, but here you've got miles of perfectly flat land, and even the slope is about exactly right for the solution just to move down the slope. If you had an engineering project to design it, you couldn't do it any better than nature did. [laughter] You put these piles out, and you put an impervious layer underneath it. In some cases you may crush the rock to increase the surface area, but in some cases they don't even crush the rock. Some of the very low-grade often is a part of a milling operation, so the better grade ore goes to the mill and is ground. The low grade, which may have just hardly any gold in it, they

just dump it out there in great big boulders as big as this desk and spray it. They get quite a bit of gold out of it, and that's very cheap gold.

What was the work that was done here by the U.S. Bureau of Mines on that process?

Well, I think mainly it was development. One of the problems is that you have percolation problems. You have too much clay in the ore. One thing they developed is a way of adding cement to the ore. Now that seems very simple. The cement sticks to the fragments, and it keeps them from plugging up. They also developed the system of what they call French drains. How do you drain underneath there, in the impervious layer? It was almost more like engineering than metallurgy, but it was kind of perfecting a method that was already known. I wouldn't say it was revolutionary, but treating the carbonaceous ore was more of a real metallurgical breakthrough. They demonstrated the economics of it, also. One of the things that people didn't realize was that you could take a big chunk of rock and dump a solution on it. How does the solution get into the center of that rock and dissolve out the gold? Well, it does. It's amazing. It penetrates into the rock. Some of these rocks are fairly porous. You've got a big boulder, and you say, "The only thing you're going to get is the gold right around the edge." That's not true. The ore will penetrate right in and dissolve the gold. Then, when you add fresh water, because of the chemical dynamics, it tends to come back out again. This very coarse material, if it's not too hard and dense, of course, you can get 75 or 80 percent of the gold out of some of those, so in some cases there's so little difference with grinding that when they originally looked at having to build a mill for some of these deposits, they said, "Oh, our recovery is 10 percent less than with a mill, but the saving

cost is more and more, and it makes up for that."

Because it's so expensive to build the mill?

Yes. So that has opened up these enormous reserves. Carlin was .3 ounces per ton. That's pretty high grade. Well, when the price of gold went up, that went down, and a lot of these mills are mining around .1 now. That was an average grade for them, but heap leaching, they can go down to .03 or even lower, .02. One part of gold per million parts of rock, and they still make a profit on it. So that has opened up big reserves, because for every ton of .3, there's probably a hundred tons of .03. [laughter] So it has opened up literally billions of tons of reserves, and that's another thing, I guess, that bothers the environmentalists, because there's a lot of this rock which would never have been treated before—ever. Never have been disturbed, and here you got these enormous hundreds of millions of tons of this material that's been dug out and blasted out, which would have stayed right where it was without heap leaching.

It's an interesting, complex situation of being able to get the gold out of the ore in such microscopic amounts and the market prices going up. All of that has created the problem that has attracted the environmental issues.

One of the things people say is that, because this was an unusual type of deposit, Newmont had to develop a whole, new, secret process. You ever heard that story? Well, that wasn't true at all, because the standard process worked beautifully. It worked even better, because the gold was so fine. It went in solution almost instantaneously, so it was perfectly suited for the standard cyaniding process that had been used for a hundred years. It was only in the carbon-

aceous ore. The original Carlin and all those oxidized deposits, there's nothing tricky about those. It was just the good, old, standard process. I think I did tell you that one time Frank McQuiston was talking about using solvent extraction at Carlin, and that works. They use that a lot in uranium. Frank McQuiston had worked a lot in uranium, and he proposed to the president of Newmont, who was Plato Malozemoff at that time, "I think maybe we should consider solvent extraction at Carlin."

But Plato Malozemoff, who himself was a very brilliant metallurgist, actually, said, "Well, I believe what you say Frank, but we've got a heck of a deposit here. I'm not going to take any chances. We're going to use the tried and true cyanide process." Which they did. [laughter] He didn't want to experiment.

What do think would have happened if they had used the solvent extraction?

Well, it would have solved one problem—this cyanide problem that we have everywhere. Actually, there's a big mine in Russia that I visited that does use solvent extraction. The economics just aren't quite as good as cyanide. That's the problem. There are other methods that can be used; there's a thiosulfate that can be used, so cyanide is not the only way to go, but cyanide has caused so much problem. It's been blown all out of proportion, you know, the dangers of cyanide. It has been very hard on the industry, and it still is. I don't think there's been any serious health problems caused by cyanide, really, but it does mean that you have to be very careful. One thing about cyanide—it breaks down very readily if you've got a leakage. If it gets into the aquifer, there's less known about how that survives. It's like a lot of environmental things—mercury and asbestos and various other things—that have been *tremendously*

over-exaggerated. When you think of the billions of dollars we spend on this asbestos clean up, it's just stupid, absolutely stupid, and now people are starting to realize it.

One of the first times that I was able to see the issue of cyanide was when I was doing interviews at Silver Peak. They showed how the tailings had been just washed out on the playa. They were telling me that if you put it out in the sunlight and the air, the cyanide just evaporates. The families used to go out there and picnic, and nobody died from being out there, because it was neutralized.

In fact, cyanide is created synthetically, but it's a natural product. There's a little bit of cyanide in the soil everywhere, but when people come out and visit the mine, they are afraid to walk into the mill. [laughter] They all think they're going to get poisoned just walking into the mill. There are people working right in there; they've been working there for years. Well, you know, if somebody had been smart, the manufacturers of cyanide years and years ago would have come up with a brand name, so it wouldn't be cyanide. It would be some other fancy name that wouldn't connect you with the cyanide pills that are used to kill prisoners. Cyanide is kept in an alkaline state to process gold. The danger of cyanide is if you get it on the acidic phase; then it puts out gas, and, of course, that is dangerous.

That is monitored in the mills?

Oh, yes. It's always been monitored. The only problem that they've had with cyanide is that there has been a problem with bird kills, because the birds are very sensitive to it. That was another *bete noire* for the miner, but they've eliminated that pretty well, now. They apply netting and various things. So the industry has solved some of these prob-

lems. I think that's one of the things they should make more of an issue, "Here, we realized we had a problem, but we've solved it."

You've seen a lot of changes, haven't you?

I'll say. [laughter] It's amazing. This one fellow said, "Has the mining industry really changed?" Then the other question he asked me, "Well, I'd like to say something good about mining." He said, "Can you tell me something I can say good about mining?"

Well, I told him about some of the cases like the Homestake, which is famous—the beautiful job of reclamation they've done—and some of the areas where they've designed the dumps to make an art form out of a dump, and things like that, and for the reclamation, you know, some of the positive things about it, telling him about this Martha Schwartz. He did contact some of these people, I think. It wasn't a bad article. It was a little bit biased, but not as bad as some.

I wanted to ask you about women in mining, because that's another change that you've seen. You started out of school in the 1940s. Were women doing anything in mining in the 1940s?

Well, women started to get into geology.

Were there women in your classes?

Yes. Very few, and there were no women allowed on summer geology, until years later, because that was camping out. At Stanford now, of course, they have women. U. S. Geological Survey had women going way back. Geology was quite a common course for women, I think. I've talked to a lot of women that took courses in geology and didn't necessarily go into the field, but it was a course that quite a few women took, particularly at

some of the women's colleges. As far as working in the mines or in the plants or in the engineering, of course, there was practically zero.

What about prospecting? Have you run across any women?

Not so much prospectors as claim owners. A lot of women got into the ownership of claims, and they were pretty good promoters, some of these women.[laughter] I remember a woman here named Price. They called her the Antimony Queen, because she had all these antimony claims all over the place. I did know another woman in California, Dorothea Moroney, who they called the Chrome Queen, because that was during the war when there was a shortage of chromite. I just happened to be working on that with the survey, surveying these deposits. She was very smart. She went out and picked up all these chrome deposits. She was a very attractive woman, and she went back to Congress and sold Congress on giving her some big government grants, so she was quite an operator. [laughter]

Yes, and a good businesswoman.

Very good businesswoman, yes. But most prospectors, I think, would have been more sort of husband-and-wife teams. I don't know that too many of them went out on their own. I think that was pretty rare.

When do you remember starting to see women more out in the field and in the operations?

Well, it wasn't until the 1970s, of course, with the rebirth of mining. We started hiring people like truckdrivers in the pits in the early 1970s, and they were working in the mill and different jobs. Of course, the women were very good truckdrivers. They

were really better than men in many cases, because they were really more careful. Men tend to be a little bit macho, and they'd tear around and end up backing their truck over the dumps and things like that. Women tend to be a little bit more cautious, I don't know—maybe after they get used to it, they'd be like the men. And more, they want to try to do a good job. The men get sort of, I don't know, a little bit more braggadocio. You know, they're trying to show off. I don't think the women held that theory. Everybody's always wondering about the women. They come in with exactly the same power structure as men. Are they going to just be like men? I don't know. I don't think so. I haven't seen that.

Well, it was very hard on women in those early days. Oh, my gosh. They took a terrible beating. It took a certain kind of a woman, and it's still true now. They take a terrible kidding. They didn't think it was mean, the men, but it was mean. I remember there was one woman who used to ride the bus out to the mine, and she took a terrible beating. You had to be really tough. What you had to do was give it right back to them, you know, and a lot of women just couldn't do that. Some caught on to that, but I think that's still a problem. Then, they sometimes just start crying. Of course, that doesn't help.

What did you see out at Carlin the last time you were there?

Well, there was a woman metallurgist who was in charge of an enormous roaster, two-hundred-million-dollar roaster, and there are several women that have high jobs, actually, in metallurgy in the plants—not so much in senior management in mining. They seem to be more in the metallurgy and the plants, but there are a lot of women mining engineers and women in computers, that sort of thing. I don't think that too many

out there are really up in the line positions of management in mining, like a general manager, something like that, but they will be eventually.

Yes, as they get the experience and so on. That's a big change. There's quite a few more in the classes, I've noticed, when I've been over in that area on campus.

Oh, yes. Well, I certainly encourage them, and I've even given a couple of scholarships to women, you know, through the Nevada Women's Fund. I think it's great. Well, it gets back to the schooling, of course. I don't think they are encouraged enough, even back in high school, to take science courses.

It starts earlier than college?

Oh, yes. It has to be in high school, because if you've ever seen those graphs, the boys and girls track each other in mathematics, but at a certain age they start separating. I don't know whether it's due to dating, or are they beginning to think more about being attractive? I don't know. I'm certainly not an expert on it.

Beauty over brains, that kind of thing?

Well, they think that being in mathematics might lose your popularity. The boys get sort of uncomfortable with this. I think that's changing, but I think there's a little bit of that still.

Now, when you were working with Alan Coope, my understanding was that Harry Treweek's wife, Clemmie, was very much involved with his assaying. Is that right?

Oh, sure, she helped. Right through the whole process.

Did she know the assaying process?

Yes, she did.

Maybe that's one of the ways that women were involved, before it became more accessible, was through husbands?

Yes. Well, of course, the other obvious problem used to be, when I was in school, the idea of a couple, a man and a woman, going out into the field together. That was always considered to be just too difficult. You'd have just the simple sexual tension involved with an attractive woman, you know, and most of the men would have a hard time wanting to come on to the woman, but that has changed now, because women do accompany men in the field. This happens a lot now. Well, I've had women working with me. They go right out in the field with the men, but they are able to keep the professional status. They are able to do that now, which they couldn't do so well before. That's the one thing that held women back. People just decided that that's going to cause all kinds of problems.

It was such a different time, wasn't it? I mean, now women go everywhere, and you have things like sexual harassment and so on, rules about what's acceptable and what isn't, but back then it just wasn't done, and so it wasn't clearly understood how to go about it.

And the women, I think, have been able to keep that professionalism and to not think they'd have to be attractive to the men. They just sort of compartment that, and they may be attracted to a person, or vice versa, but they just keep that separate from the job. Yes, so that's been an important change, I think, and women can go everywhere. I guess you sometimes have some things get maybe a little out of hand.

Yes, probably anywhere. Now, when you were at Carlin, were you married at that time, or were you single?

I've never been married. I'm single, yes.

Alan said that you were two single men over there, so you were staying in a motel and going out during the days.

Yes, that's right. I always use the excuse that I traveled too much, all around the world, but I don't think that was a very good excuse. If I'd wanted to get married I probably would have.

But it makes a difference in terms of living arrangements and moving.

And, of course, a lot of the things that I've done, I couldn't have done if I had been married, though, because I've lived for long periods of time way out in the bush. I wouldn't have felt it would be proper to my wife, really, but, you know, my wife could have loved it. Most geologists are married.

You went from the Carlin to Canada, and you've also been in Africa?

North Africa. I spent two years in Morocco. I've been in the Middle East quite a bit, spent quite a bit of time in Turkey and Iran. I visited South Africa, but I haven't really worked there, although Newmont had some important interests in South Africa. I always thought that eventually they'd send me down there, but it just didn't work out that way.

John, we talked about the importance of Ralph Roberts's report, and I'd like to have you go into that a little bit more. For example, you made the comment that you found what you were looking for—was that all based on Ralph Roberts's report?

Well, it was based on Ralph Roberts's geological theory, but the models that we were looking for, of course, were based on existing mines. There were existing Carlin-type mines. They weren't called Carlin type at that time, but, in particular, the Getchell Mine and the Goldacres Mine. Those were really our two models that we were looking for. I think that I said earlier, they weren't very large ore bodies, and we had hoped that we might be lucky enough to get two or three of those together, close to a central mill that would make an economic operation. We never anticipated that we'd find anything as big as the Carlin deposit, which is many times the size of either the Getchell or the Goldacres. Those were in the order of two or three million tons, and Carlin was eleven million tons.

You said that you were looking for small values scattered in a big area?

Well, disseminated. One of the characteristics of Carlin mineralization is, it's beautifully disseminated in the rock, which is not typical. Most gold deposits often are in veins, and you get highly erratic values, whereas, Carlin deposits are very uniform values. The gold spreads very uniformly through the rocks, very little variation, and that's one of the principal characteristics of that type of deposit. Because of that, it spreads into larger dimensions, which makes it amenable to open-pit mining, as opposed to the narrow veins. Most golds are narrow veins, like five or ten feet wide, which you can't mine by open pit.

Were you really being guided by Ralph Roberts's report, based on that information?

Well, we had the idea of a model and the idea that this type of gold could not be panned. In fact, that's what that 1939 report said, that there should be more of them

around, but the question is how would you find them? We couldn't just prospect the whole state. Ralph Roberts's development of this Roberts Mountain thrust gave us a method of prospecting, because his reports indicate that some of these deposits were related to the Roberts Mountain thrust, so that gave us a *modus operandi*, you might say. Instead of looking everywhere, we just concentrated on the Roberts Mountain thrust, so that was very helpful.

Describe to me what that Roberts Mountain thrust is all about?

Well, Roberts Mountain thrust is an enormous, flat structure, where the rocks are actually pushed laterally from west to east about fifty miles, and you have rocks that were originally from deep down in the ocean and were pushed up over rocks that were so-called "shelf facies," which were formed right at the surface. So you had quite a change of deep-seated sediments which were pushed over, sitting on top of what they call "shelf sediments," which are limestones. It's formed at very shallow depths, and that is the way that anybody recognized that this had to be a thrust, because of the rocks of very different origins sitting on top of each other. That couldn't be a normal situation, because they knew that you don't get shelf rocks under deep-seated rocks; they had to have been coming from somewhere else, and that's the theory that Ralph Roberts developed.

Could that have been an earthquake type of thing that would have pushed that over? Do they know?

Well, they don't know a lot about these flat thrusts. They are very peculiar structures, and some of them are actually thought to be gravity—just big subsurface slides by gravity. Whether they're compression forces,

they don't really know. They go on for miles and miles, some of these. There are a lot of these structures like this; they're very flat and just go for miles, literally. I don't think anybody has completely figured out how these enormous rocks slide so far.

But it's unusual?

Ah, no. Thrust faults are not that unusual. In fact, there are a lot of other thrust faults in Nevada—different, younger thrust faults, one on top of the other. You get what you call an imbricated structure. You have one thrust right on top of another.

And are all of them potentials for this disseminated gold?

No. Actually, later we found that that's where sometimes your models fall down, because you don't have to have the Roberts Mountain thrust to have a Carlin type deposit. It occurs in other environments, also. What the relationship between the Roberts Mountain fault and these gold deposits is, is still a little bit undetermined, because we had the idea that solution would be moving up the Roberts Mountain thrust, and the ore would be right in the structure itself, but that wasn't correct. The ore was actually underneath it, and the solutions came up vertically and hit the thrust, and the thrust may have acted sort of as a capping, but the mineralization wasn't right in the fault structure itself. That's some of the discoveries that we made later in Cordex, because we decided, well, maybe we should be looking in areas other than the Roberts Mountain thrust. So in 1970, when I came back to Nevada, we started looking at some other areas, and that's how we found that Pinson deposit, which is not in the Roberts Mountain thrust. Since then, they have found a lot of other deposits that are not really close to the Roberts Mountain thrust. They may be related

to other thrusts or steep angle faults or other controls.

So, originally, the Roberts Mountain thrust was something that gave you an idea of where to search, but over a period of time you've discovered that that was not the guiding factor?

No. That was the original idea, because the original Carlin ore body was in a certain stratigraphic horizon, which is the Roberts Mountain formation. It's confusing. [laughter] There's the Roberts Mountain thrust and then the Roberts Mountain formation. The original Carlin ore body was in the Roberts Mountain formation. So everybody was looking in the Roberts Mountain formation, but later they found that the Carlin deposits are in much higher rocks stratigraphically. Again, it wasn't confined to that either, so it's ended up that the Carlin deposits are in very different environments, but they all have one thing in common. They all are in the same kind of rock, so there's a very strong lithologic control—rocks that are what they call "calcareous rocks," which means they have a certain amount of carbonate in them. The carbonate is very important, because it allows the solutions to spread for great widths and to form these enormous, big ore bodies, hundreds of feet wide, which only would occur in this type of rock. So that's the one feature that's probably the most important characteristic of all. They have to be in that particular kind of rock, but, of course, there's an awful lot of those rocks around, and they don't all have gold in them. [laughter] So you have to have a combination of the right rocks and structure for these solutions to rise up from below. You have to have a combination of conditions for some structural control, but the basic lithology is very important. In fact, the original Carlin deposit was more or less following one bed of this carbonate that's about a hundred feet thick.

Is prospecting still the best way to locate this, or has that changed, too, with your increased knowledge?

There are some geophysical methods that can be used and have been somewhat helpful, particularly in some of these deeper occurrences, looking in these so-called pediment areas. These pediment areas in Nevada are flat slopes that you drive through, and they're often covered with very thin alluvium. Sometimes, by determining the depth of the alluvium by geophysics, you can determine whether that area is worth prospecting, but still, geological mapping and surface prospecting and sampling is still a very important part of it. Now, of course, a lot of the future is in these deeper deposits, so there you have to use geology, extending known and geological structures to depth or by some geophysical methods. What I'm hopeful for, is that they'll develop some down-the-hole geophysical methods that you can test, down-the-hole measurements that might indicate the proximity of an ore body.

The future is in the deeper ore bodies, because the surface has been pretty well explored. I don't mean to say there won't be more. It's very interesting—some of these very important deposits have very small surface expression. For instance, the Dee deposit we discovered—the outcrop wasn't any bigger than this room.

And this room is, maybe, twelve by twelve, or something like that?

Yes. So, you literally have to always cover everything; you have to almost crawl on your hands and knees. I mean, you could walk right over something. In fact, the Dee deposit—a number of people had walked right over that deposit. It was so small an area, and they didn't know exactly what to look for, but, fortunately, we had this DeLaMare,

who was a very sharp prospector, and he spotted that particular outcrop. There were several like that, that had a very small surface exposure. So there are probably more of them around.

But those are the ones where you say the structure goes down to quite a depth, then?

Yes. And they will be underground mines.

Like the Mickle Mine and those?

Well, already there's a big movement towards underground mining, and there are a number of underground mines going now in Nevada. It's kind of interesting because we thought we sort of got away from underground. In the past, that was always most interesting. Then we got into open pit mining. And now we're going back to both underground mining and open pit.

And both, because of this Carlin type deposit?

Yes. Luckily, some of these deposits are high enough grade that you can mine them properly underground. That Barrick Mine is extremely high grade. That ore is running about two hundred dollars a ton. So you can see that even though underground mining is expensive—you have to have refrigeration and all kinds of extra costs, and the metallurgical process is expensive—it's still very profitable.

The underground is still high overhead in terms of the structure and the equipment and everything that goes in, versus the open pit.

Oh, yes. Mining costs are much higher, but if the grade is high enough, then it is profitable.

I wanted to ask you a little bit more about your sampling. There was some sampling along a dike when you were working?

Well, a dike was one of the other characteristics that I didn't mention that you're looking for. You had to have, first of all, the calcareous rock, which is a calcareous siltstone or a limestone. Then you had to have some structure cracked to bring the solutions up, and often those cracks were filled with dikes. So a dike was a very important thing we'd look for. The other important thing we'd look for was silicification. Jasperoid is one of the principal features we'd look for, because there's always silicification, introduction of silica with these deposits, plus pyrite. So what you're looking for is, first of all, the right kind of rocks, the calcareous rocks. You're looking for structure, which is often reflected in the dikes, and you're looking for a certain type of rusty color, which indicates pyrite, and silicification. Those are the main criteria you look for when you're prospecting on the surface.

And when you were talking about a dike, you're not talking about the kind of dike where somebody has built a dike to hold back water?

No, it's just a tabular body that comes up a crack, and it's a steeply dipping body, as opposed to a flat body. It's steeply dipping, coming up, cutting through the rocks. It may be ten or fifteen feet wide, or it could be wider, actually.

I wanted to ask you about when Alan Coope joined you in the prospecting. He had a background in geochemical prospecting?

Geochemistry. Yes, he had a Ph.D. from the London School of Mines. He had a very fine education, and he trained under one of the great experts on geochemical sampling,

which was kind of a new field at that time. That was just coming in, that idea of sampling of trace elements. Sampling, like stream sediments and soils warming, was kind of a new prospecting method, as opposed to just panning. So that was important, having his knowledge, because some of the work that we did, we did look for trace elements that we knew were associated with the gold. For instance, there's arsenic and antimony and mercury. Those are the three elements that usually are associated with the gold. He determined that fairly early in our work.

How did you find working with Alan?

Oh, he's a very fine man, just a wonderful person to work with. He was young, of course. He had some experience in Africa, but he was just sort of learning the business. We enjoyed his company, because we worked very closely together for several months.

It leads me to ask whether you made some friendships during all of this prospecting of the Carlin trend that lasted for a while, I mean, like Alan and Harry Treweek?

Well, of course, Harry and Clemmie Treweek. They were the ones where we took all our assays. They were very fine people, too, and we were very close to them, but actually, not too many. Prospecting is a fairly solitary life, you know. So we had some local friends in the community, but as far as people associated with the work, there was no exploration going on then, so there were no other geologists around much. Except, oh, Pete Galli was one, but really we had no other professionals to talk about. Well, now you have hundreds of geologists around here.

You were there such a short time, too.

Yes, it wasn't very long. Well, four or five months was the whole thing. We were amazingly lucky.

I understand that around September, October, before you took off to Canada, you had visits from Fred Searls and Bob Fulton and also Ralph Roberts?

Yes. Well, we were following the Roberts Mountain thrust, and we thought we had it fairly well figured out, because to identify the thrust you have a big contrast of rocks between the deep-seated shales and cherts and limestone, which are fairly easy to distinguish. We thought we could identify the thrust as we prospected, but when we started getting some values on Popovich Hill, even though they were very low values, we wanted to assure where these were in the Roberts Mountain thrust, because that would have given it a lot more importance. If those values had just been out in the middle of nowhere, we wouldn't have paid much attention to them, but if they were in the Roberts Mountain thrust, which is where we were looking, they would be more important. So we invited Ralph Roberts out there to identify this spot and tell us that we were, in fact, in the Roberts Mountain thrust. He verified that, and that was a good help. We didn't tell him what we had out there, because we hadn't even staked the claims yet, so we didn't talk about gold values, at all. Also, we traveled around other areas, some general geological excursions, and got the benefit of his knowledge of that area, which was much more widespread than ours, so that was very helpful.

Did he come before you had Fred and Bob Fulton come out?

Yes, he came before. So then, the next thing, we had these very low values scattered over quite an area, which is interesting, because it looked like it might be disseminated,

but very low, and we knew we were in the Roberts Mountain thrust. So then, I decided, well, this is something we have to follow up on. We didn't even have the ground staked at that time. That's when we invited Fred Searls and Bob Fulton out. I told that story many times. I think you have that already about Fred Searls not being very interested. He wasn't very impressed with the showing we had. It was getting kind of late in the day, and I turned around, and he said, "Well, John, if you want to stake the claims, go ahead and stake them." [laughter]

But he didn't really have a lot of faith in this?

No, he didn't. Well, there wasn't much showing, but it was in the right setting.

Was Bob there at the same time?

Yes, he was there, too.

Did he have any different reaction?

I don't remember his reaction so much. I think he was maybe more interested. I don't think he had any doubt that we should stake the claims.

What took place then, when they said go ahead?

Well, then we staked the claims. The first thing we did was to put in some bulldozer cuts. We did quite a few cuts in there. Most of the values were very low, really, like what we had on the surface, but we did have this one area, that went right alongside one of these dikes, where we had some better values. We were getting close to commercial values. So then, we decided this is something we have to follow up on seriously with drilling. That's when I left. Six months later Bob Fulton took over with Pete Loncar, and they started drilling. The second hole—they

ran into the high grade almost immediately. That's when development started.

You'd already done your job in locating this and getting the claims set. Tell me a little bit about Fred Searls. You worked primarily with Fred, correct?

Yes. Well, I worked for different people in my career at Newmont, depending on where I was, but during that particular time I was working for Fred Searls. I was over at Eureka. Then I was scouting different properties, and I was corresponding with Fred Searls. Well, he was a remarkable man. I had a tremendous admiration for Fred Searls. One of the reasons I went to work for Newmont, was because of Fred Searls, because he had such a reputation as a brilliant geologist. He would take on imaginative, high-risk projects on the basis of his geological theory, and I liked that idea. Newmont was very active in exploration at that time. Searls was kind of a character. He liked to box, you know. He liked tough people, and he was kind of a feisty guy. In fact, I remember one of the mine managers was a real tough guy. Those were the early days, and Fred Searls liked that. This mine manager would go down to a bar and pick a fight with somebody. Fred Searls thought, "Oh, he's a macho guy."

He was a terrific worker. God, he just wanted to work—a workaholic. He'd work all day in the New York office, and then he'd come out on the weekends and visit all the mines. [laughter] Keep all us out there working on the weekends, too. Bob Fulton was another tremendously hard worker. He was really dedicated. He was a wonderful man. Yes, he just worked all the time. They said that Newmont didn't have too many people, but they got a lot mileage out of their people.

Expected them to work from sunup to midnight?

Yes, that's right, but it was work that we were enjoying. Nobody told us we had to work, but we just did. So I never felt exploited. You know, a lot of these people think that their employers are exploiting them. I never had that feeling.

When you were looking into this, was there any excitement for you, in that you were looking into something different?

Well, it was very exciting, yes. This was a whole new type of deposit. It was quite different. It looked like we might have a chance at really developing something new, or maybe more than one deposit, actually, because it was the idea that the old timers might have missed it. Of course, one thing is that you're always waiting for the assays. Every day is a new day, and you can hardly wait to get those assays from Harry Treweek. [laughter] He was good, because he would get them out very fast. We'd want our results right away, so we'd know we had something here. We wouldn't know, because often we'd have to wait a week, but he'd get them right out the next day. So we had very quick results, and that was very helpful.

It was helpful in guiding you, because you knew whether or not you were in the right area?

That's right. And he was measuring down to very low levels of gold. All we wanted to know, initially, "Is there any gold in the rock?" We didn't care how much there was. We just wanted to know, is there gold in the rock? He could tell us that, whereas, a lot of other assayers at that time were not accurate enough. They'd take a sample that maybe had no gold in it, but they'd give you a little. They'd say a little bit of gold, because they weren't accurate enough. They weren't keeping their equipment clean. When he said there was gold there, even

though it was very low quantities, we were confident there really was gold there. That was very helpful.

When I hear you talk about this I'm so impressed at the combination of people and talents and timing and information that all gathered in that one location to make this happen.

Yes. Well, we were lucky, because there were no assay offices in Nevada. The nearest assay office was in Salt Lake City. That would have been very inconvenient to send samples there and maybe wait for a week or ten days to get our results back, so we knew we were lucky. There wasn't even an assay lab in Reno at that time. Hard to believe. Now, there are about twelve of them, I think. [laughter]

John, you were just mentioning that the prospecting for the Carlin trend was not complicated.

Yes, we just resorted to pretty standard prospecting methods. We soon found what to look for, like those four criteria that I mentioned. It was a matter of understanding the geology, so it was helpful being geologists, where we could map the rocks, map the stratigraphy and structure, but it was a lot of just tramping the hills and collecting a lot of samples and observing the rocks. We didn't ever find any other, more sophisticated methods. We've tried a few, but the more sophisticated methods, like geophysics, just didn't particularly apply in this. We were looking for something on the surface, because it had to be open pit, so we weren't looking for stuff at any depth, so that was one-half. We were simply looking for something with the outcropping on the surface, so that made it simpler.

Why did it have to be open pit?

Well, because, particularly in those days, the gold was still thirty-five dollars, so the only kind of ore that you possibly could mine would be open pit, because the cost is so much lower. The Carlin ore bodies were later mined underground, but most of them were too low-grade to be mined underground, so you had to be looking at open pit, but also, the open pit deposits, because they're more extensive, were really better targets, because you have a larger ore body, and you can produce bigger tonnages. It's more attractive than a small underground mine.

You mentioned that the mining industry has really been revolutionized in the last ten years. Could you give me some examples of what you've seen?

Well, until what they call the Organic Act, FLPMA, [Federal Land Policy and Management Act of 1976] came out, there really were not nearly as many controls on what you could or could not do on public land. Of course, there were EPA controls on air pollution and water pollution, but, basically, as far as working on the land, all you had to do was go out and stake claims and start digging. [laughter]

And this was in 1960, 1961?

Up until 1981, actually. FLPMA came in 1976, but with all the problems with the regulations, it didn't actually go into effect until 1981, and that's just when the Carlin boom was starting. When the early heap leaching operations were starting, there were no regulations on heap leaching or the type of pads you had to lay out. Most people tried to do it properly, but there were no regulations on it. Then they came in with all these very complicated regulations on how you had to prepare a pad, putting the liners under them. Then you had to have notices of operation with BLM. So you had a whole

series of regulations that started coming in in 1981, which changed the whole nature of the industry. The state reclamation law came in about that time, so, really, the whole system was revolutionized in the 1980s because of government controls—the BLM, the state EPA, which was controlling reclamation.

You just said that the Carlin boom really hit in the 1980s. So was there a twenty-year period between the time that you made this discovery until it really took off?

Well, actually, it's interesting, because that discovery was made in 1961, and it went into production in 1965. There was a big rush of exploration around that time looking for other Carlin types, and that was one of the problems. I think they were looking for an exact model. One thing about the Carlin, it was in a so-called window, where the rocks had pushed up and the lower plate rocks were exposed, so everybody was looking for windows, and they were looking at the Roberts Mountain formation. They're looking at a very confined model, and the only other deposit they found at that time was the Cortez deposit, which was similar, but much smaller. That was only about three million tons. Then they really didn't come up with anything much, and people got kind of discouraged. The price of gold was still thirty-five dollars. It's very interesting, but even Newmont got discouraged. Newmont decided, well, the Carlin was a good mine, but most of the others around here are pretty small, so really they're not big enough targets for us. So Newmont actually stopped exploration for gold in Nevada for several years. [laughter] That was hard to believe. They were looking for other things, copper and molybdenum. There was a long period in there. But, you see, we were the first ones to revive exploration. I came back in 1970. I thought there were more to be found in 1970, even though the price was still thirty-five dollars. I convinced my Canadian

partners to fund our program—Pete Galli and myself of Cordex. Even though the price was thirty-five dollars, they were still willing to do it, so we started our program, and we found a couple more deposits fairly soon, actually, but we had the whole state to ourselves, as a matter of fact. [laughter] Pretty much.

Because people had given up?

They'd given up on it, yes. Then, in the late 1970s and 1980s, the price of gold started moving up. That, of course, changed everything. Heap leaching was becoming well established. All of sudden, there was a tremendous rush into Nevada, and a lot more discoveries were found.

When you came back in 1970 were you still following the model of the Roberts thrust?

No. I realized that we should look into a broader environment, not just the Roberts Mountain thrust. We had to look for the right rocks, first of all, but then, one of the logical ways was prospecting in areas that already have gold, and there were a lot of other areas. For instance, the Getchell was a known deposit, so one of the first places we looked was around the Getchell area, and that's how we found the Pinson. We were looking for any other area that had gold—and not necessarily the Roberts Mountain thrust. We had found an area way down by Beatty, actually, which is far away from the Carlin. I went down there, and I took some samples at a small prospect, and I realized that it was Carlin type mineralization, way down there. So we developed another little mine there, the Sterling. We weren't only looking for Carlin deposits; we were looking for other things, too, actually. For awhile we even had a few copper projects, and we looked at uranium for awhile. We were looking for, maybe, other gold deposits in volcanic rock, but Carlin was always the big

objective, to come in and identify Carlin type mineralization, even with one sample. This is what happened to one of our discoveries; we just had one sample out of about five hundred, but just having one sample that we could identify as Carlin type mineralization, we knew that we had to do a lot of work in that area. So that was always our number one priority, but we were looking for other things, also.

It's interesting that you found the Carlin deposit in 1961, and there was a flurry of prospecting, but then people got discouraged and gave up. The price of gold stayed the same, and you came back in 1970, and it was, again, very few people in prospecting. Then, it was the price of gold entirely that did it again?

That's what did it, yes. We made two discoveries in 1971, Pinson and Prohle, and I think that encouraged others. Then there was another discovery at Alligator Ridge, and that sort of perked things up a little bit, but it was mainly the price of gold coming up, and then the heap leaching, because that changed the whole economics of gold. It made it so that you could treat extremely low-grade rock that was never even considered of interest before, and these enormous bodies of low-grade rock became economic. So, for every million tons of Carlin type ore, there are billions of tons of heap leach ore. [laughter] Enormous reserves of that, down to one part per million, actually.

So it was the combination of market price and the technology, and then, there was the expansion of all of this work, and the government regulation followed?

Well, they came in about the same time. That was, more or less, a coincidence. I don't think that was a result of the gold boom. See, the BLM had started off with having all the grazing regulated. You didn't have any

grazing regulations for years. I forget when the first grazing regulations came in, but they were gradual. Everybody said, "Well, we have to have more control of what's going on in public lands." So this had been building up for quite a few years. As I say, the forest service had their own Organic Act on how they would administer lands; that was many years before, but the BLM never had any act that told them how they were supposed to administer their own lands. This was building up in Congress, and finally it was a very controversial thing, because a lot of people, including the miners, didn't like it. So they fought this FLPMA—the miners and the ranchers. Finally, it ended up in Congress, and it got through on the very last day of the session, railroaded through in 1976. It happened to be just before the price of gold increased, but there was no connection there, really; it just happened to be coincidental.

It's interesting that it went through the very last day. It must have been a tough fight.

Oh, yes. Really tough fight.

Have there been various battles about the regulations since then?

Continuous battles over the regulations. Every year there's a battle in Congress—every single year—over the 1872 Mining Law.

You mentioned that you could see ways that it could be changed to make it acceptable. Could you explain that a little?

Well, I always thought that there were some mechanical things about the law that were very bad, like the way of staking claims, which went back to the early days of California when a group of miners got together. There were absolutely no controls on the land, and they just came up with a few little simple regulations, which became the 1872

Mining Law. They can stake claims in any different direction, and this terrible overlapping of claims. You had this theory of extra lateral rights, which was designed when you had simple quartz veins, which caused all kinds of lawsuits. There were a lot of mechanical parts of the Mining Law that were very anachronistic. I had worked in Canada where they eliminated most of those terrible, stupid, overlapping claims, so the one thing I thought, really, "Why can't we change those claims?"

Well, one of the problems is the industry. They wouldn't object to that, but they were afraid that if they changed some of the mechanical parts of the mining law, that it would open up the whole discussion of changing, increasing the regulations. Land use or land management is what they were concerned about, so the big battle was not over what I'm talking about, but it was over the management of the public land, and more control, more control, more control, which is what the environmental community wanted. All these really obvious changes still haven't taken place and may never take place. I always thought that you could get a consensus between the environmental people and industry—a livable law that would give the environmentalists some of what they wanted and also satisfy the industry, but it hasn't happened yet. I don't know, maybe someday it will.

You see it, primarily, as the mining industry being afraid to open up this law at all, for fear that it will just be devastated by the kinds of regulations that will come along, yet it seems like more and more regulations are coming along whether they open that law up or not. Am I right?

Well, that's what they are doing now. There's a whole new set of regulations that is coming out right today, this last week or so. What the BLM is doing is making a kind of an end run around the mining law by pro-

posing a lot of new regulations, some of which make sense, but I think a lot of them are unnecessarily onerous, really. They're just adding a lot of red tape, which I don't think is completely necessary to preserve the lands properly and use lands properly. I think the biggest question is what resource on the land is the most important resource? Now, always it has been that mining was first. That came first no matter what happened. Well, industry, I think, has to accept the fact that they cannot have the priority, that you have to look at other resources—recreation resources, scenic resources. The big question is how do you determine that? No one has figured that out yet. I mean, the environmentalists want to have complete say. Some of them, frankly, want to stop mining. Nobody wants to say that, but a lot of people really just want to stop all development on public land—mining, logging, grazing, everything. That's the extremist element of it, though. There are others that are much more reasonable. But how do you determine, for instance, whether a beautiful scenic aspect is more important to preserve than a very rich mineral deposit? It's very difficult just to determine that. Very difficult. That is really the big battle. Now, I guess, environmentalists want to be able to say, "Well, we can stop that, because we think its scenic qualities are too important," or some other factor. I think it can be worked out, but very difficult.

I always like the idea of a committee to make these very tough land-use decisions, to have some kind of a blue ribbon committee set up. See, the BLM doesn't really like to make these decisions, either. It's very tough for them, because they're hit from all sides—the environmentalists, the miners, and the ranchers. I think they'd be very happy to have somebody else do it. [laughter] If you could set up a blue ribbon commission of very outstanding people who are broad-based people and who don't regularly represent any special interest, then you

could have them make some of these tough land-use decisions. But it hasn't happened.

It has happened in some small cases, where for some special small problem, they've set up an ad hoc group. Susan Lynn worked on a couple of them up there in High Rock Valley. It's been done on a small scale sometimes, but not on a large scale. Now in the grazing, of course, the ranchers have done some of that, where they've gotten these groups together, but it hasn't happened on the public land in Nevada, in particular, with the mining people involved. It hasn't happened yet. Something like that is going to have to happen, eventually.

To work on some sort of a consensus on this?

Yes.

That leads to another area you talked about, the government and the mining industry working together. Is this one of the ways that you see them working together—having a blue ribbon commission to make some of these decisions? Or are there other things that you had in mind?

Well, I was thinking of that when we were talking more about research, like this research that's being done out at Mackay School of Mines, this CREG research. Well that has not happened except at the university, but in geological research, engineering research, and a lot of cooperation. The oil industry is very good at working with universities, for instance, on research projects. I think I mentioned before that South Africa is very successful in developing a lot of new mining techniques in an organization they call the Chamber of Mines, where the government and industry work together very closely. In this country it's very difficult. I don't know why it is that we cannot seem to work with government too well. Sometimes it works out.

There's the distrust of the inefficient bureaucracy. Of course, that's sort of ridiculous, because there are an awful lot of very capable people in government. Some people have the idea, well, they're all bureaucrats, and they hate to have to deal with them, but it can be done.

You've been in other countries. You mentioned Africa, Canada. Did you see differences in other countries?

Yes. They are more like South Africa in Canada. They're very close. Again, close cooperation.

And how does that work if the business and industry are working together? Do the environmental issues figure in there too?

It could work.

What about the environmental movement?

No, it hadn't started. Yes, well, it has to work, of course, obviously, because industry has to get along with government, so that's one of the environmental things. I was talking more about research, which is something different, but when it comes to the management of the public lands, the industry and government are working together all the time. They have to work together. They often work together with great difficulty. [laughter]

A lot of conflict? Another thing that you mentioned was that there's been such a change in how people view mining from the 1940s up to today. One of the comments that you made is that the media has made this into an emotional issue. I was hoping that you would complete that thought.

Well, I think so. Although most people in the country are working in industry, there's sort of a negative feeling towards in-

dustry. People think that companies are making too much money, and they're not treating their employees well, not paying enough, so there's a generally negative feeling toward industry, but it's accentuated in mining, because, where mining people work, you can see what's being done. They have to disturb the land, and it just so happens that we have this cyanide problem, and everybody has built it up all out of proportion. Cyanide waves a terrible red flag. There's this issue of the government royalties. There are certain issues that the media pick up that make wonderful sound bites, saying bad things about industry, and the people tend to believe them, because they sort of want to believe them. On the other hand, when the environmentalists put out information that's all wrong, or greatly exaggerated, they tend to believe that, because they want to believe it. So you have a real problem for the industry to get its message across to the media. The industry is not really very good at that, I think, but you have to try to just work at it. They keep bringing up little emotional issues like the royalty—that government is not receiving any royalty. Well, there are reasons for that, actually. Or they talk about the cyanide use, which is not a serious public health risk, at all, but it makes good press. So the industry gets very much lambasted in the press. The general feeling of the public towards mining, is really very negative now, whereas mining used to be considered favorably, I think, when I first came to Nevada. I'm sure as you review, if you polled people, even in Las Vegas that didn't know much about mining, they had a positive image of mining, that it's good for the state and provides employment, but I'm afraid the general feeling now is probably quite negative. Changed quite a bit in the last few years.

Have you personally experienced that?

Oh, yes, with members of my own family. [laughter] They say, "Why aren't you guys paying royalties?" You see, before the 1872 Mining Law was first established it was wide open to anything. They had discussions of royalties back in 1872. The theory was that if you want to encourage mineral resources, you want to give people incentive to get on the land and find minerals.

And so who would pay royalties? The government would pay royalties to the mining companies, or vice versa?

No. Well, there was no royalty, but what a lot of people don't realize is that the mining companies were paying royalties, not to the government, but to individuals who found these deposits. So that's the carrot. Most of these deposits in Nevada are not paying royalties to the government, but they are paying royalties, usually, to some individual who went out and found the deposits.

So, if I had a little claim out there, and Newmont or some company wanted to buy that claim, they would pay me a royalty?

Yes. Right. Now, if you have to pay a royalty to the government, that makes sense; I won't argue with that, but what is your objective? If it is to encourage mineral resources, then that means the royalty goes to the prospector. Royalties to the government will come out of the prospector's pocket, because the industry is only going to pay a certain amount of royalty. For instance, the normal royalty is 5 percent. Well, the government says, "We want 4 percent." Instead of the prospector getting five percent, he might get 1 percent, so it destroys his initiative. People don't understand that. They say, "Oh, it's terrible. They're mining all this rich ore on the public land and not paying any royalty." Well, there is a reason

for that. Now, if you want to encourage mineral development at all you have to give incentive to prospectors. A lot of people say we don't need it. "Let them mine ore in the foreign countries," but there is a certain rationale for that. Industry is perfectly agreeable to paying a royalty to the government, so that issue has already been resolved really. It's just a question of how much to pay.

And you, as a prospector at heart, continue to see a need for more prospecting?

Yes, because I've benefited from it myself for a discovery.

And that's what keeps prospectors out there working?

Sure. Prospectors don't prospect as much on private land. They tend to favor public land as opposed to private land, because they can get a bigger royalty, normally. So that's a difference, yes.

We are talking a about the change in mining over time and the image of mining now. You mentioned the impact in terms of recruiting students. Would you talk a little bit about that?

Yes. Well, when I got out of school fifty years ago—more than that—mining engineering, including metallurgical engineering, was a very prestigious field. It was a field that a lot of people looked forward to. You would travel all over the world and have a fascinating life. A lot of people were attracted to mining. Unfortunately, that has changed very radically in the last few years, because of the whole environmental issue. People have a negative opinion of mining now. People used to admire the ability to move mountains of ore and all these engineering marvels. That doesn't impress people any-

more. It's just the opposite. Mining is messing up the environment. You talk to a lot of people and say, "What is your impression of mining?"

They say, "They're making piles of money, and they are messing up the environment." I mean, that's sort of the attitude they have, which is unfortunate. And schools, I do think, may be a little prejudiced. Students are getting a lot of negatives on mining. The environment is played up so greatly. I remember I saw a program up in Canada on CBC, and they were talking about coal mining. They had a little boy that the school teacher brought in. She was obviously anti-mining, and she had him all primed. They were talking about how they were going to develop this coal mine in Canada, and this little boy said, "Gee, I hope they're not going to level all the Canadian Rockies, the beautiful Canadian Rockies." [laughter]

Of course, they do level certain mountains. So, then there's all this media stuff. I think it's laudable that people are interested in cleaning up the environment. I noticed out at the university that a lot of people are going into various fields, like some of the scholarships that we've helped in chemical engineering. In several cases they may say I don't want to go into chemical engineering, but I want to work in the environment—cleaning up the environment. Well, that's fine, but somebody has to produce these metals that we need, and I don't know how you change that image.

Because the need for the materials that come from mining has not decreased; it has increased, am I right?

Increased. Yes.

There's gold used in computers, all kinds of different fields. So what's happening, for example, at the Mackay School of Mines?

What's happening in terms of recruiting students into mining?

Well, the biggest problem they have is in mining engineers and metallurgical engineers.

They can't get students to go into those fields?

It's very difficult. Of course, it's a tough course. Any engineering course is tough. Now, mining engineering used to be a very interesting course. That's because the mining engineering profession, after military engineering, was *the* first engineering profession. The original mining engineers had to be everything. They had to be electrical engineers, mining engineers, and even geologists, because back a few years there were no geologists. So they had to know a little of everything. It was a very broad education. It still is, actually, which I think is one of the attractions of mining engineering—you get a little bit of everything, even though you don't end up in mining. That's what I tell some of these students. Of course, a lot of people I know don't want to live in out-of-the-way places now. It used to be that you'd look forward to working some mine in South America, some place up in the Andes, but I think a lot of people don't like that. They want to stay around cities, so that may be one of the problems.

They don't want to be out in the isolated, rural communities?

No. I think that may be part of the problem, but an awful lot of it is negative media articles. They just keep harping on it, over and over again. They don't realize that, first of all, mining is only a temporary use of the land. It's not as if it's going to go on forever, and a lot of these lands could be pretty well restored or even improved, actually. Although, a lot of the purists won't admit that

you could ever improve on nature. [laughter]

They've talked about turning some of them into recreation areas, you know, filling up the pits with water.

Creating lakes and wetlands and things like that. So much of it is perception. You get an idea that everything that mining does is actually ugly, but it doesn't really have to be ugly. In fact, they've had an artist planning some mine dumps down there in a certain fashion, and when he was finished he said, "This is now going to be an art form."

Like a landscape design.

Some of the mining companies do actually use landscape architects. I told you about that woman from Harvard School of Design. Harvard, which is a pretty high-powered place—she came out of there, and we showed her the Pinson pit. Of course, a lot of people think that's so terrible. You have this hole in the ground that the miners don't fill in, but we have some beautiful formations there, folded rocks of all colors—cream colors and reds and blacks. She looked at the pit and said, "This is beautiful." Just a different way of looking at it.

Do you do some work with the Mackay School of Mines on recruiting or do any work with the students?

I had been working on it, yes. In fact, I'd been pushing quite hard for them to do more. Starting this year, they have Connie Howard, and they're hiring a full-time recruiter, so I think they've really improved. Jane Long has been helpful. No, I'm really pleased that they're starting to do it, because you have to. People aren't going to come to them. They have to go out and get them, particularly in these fields.

Is the mining industry seeing a shortage of mining engineers?

Oh, yes. Absolutely. The jobs are out there, so what they have to do is hire, maybe, another kind of an engineer, like a mechanical engineer, and train him in mining. Metallurgy engineers—the jobs are there. Definitely. Good jobs.

So it's a good time? If you have a mining engineering degree, you can find a job?

Oh, yes. But they're doing a lot better job now in recruiting. Another woman, Deedee LaPoint, has been very good. You have to go out there and keep after them. It's almost like these college coaches recruiting athletes, you know. You have to go out; they're not just going to come to you.

You have to go out to the high schools and so on?

Yes, the high schools, and keep phoning and keep after them, particularly the good ones. They have a lot of choices.

We're talking here in general about the image of mining, but would you say that it's different in some of the smaller Nevada communities that depend on mining?

I think it is, yes.

It's more in the population centers that are kind of removed from the mining industry, where this negative attitude about mining has developed?

Yes, I think so.

I just asked that, because I noticed as I went out to Tonopah and Silver Peak and Mina to do the interviewing—I wasn't around any environmentalists—but it just seemed like

everybody was very supportive of the work that was being done there.

Oh, they are, yes, because a lot of those communities would hardly survive without mining. It brings in good jobs. They talk about all these Western towns. They think Western towns are going to be all recreation now, and they're getting rid of the extractive industries, and they are not too happy about it. You read that *High Country News*? They talk a lot about that, "Gee, it's great. We get rid of all these terrible extractive industries, and we'll just have these towns become recreation centers." Now they decide, well, maybe that's not so good after all, because you have all these low-paying jobs, people who are just maids and McDonald's people. Whereas, Elko is a really nice town, because it has a very good income mix. See, it has ranching; it has highly paid blue-collar workers, miners. They have a lot of professional people in the mines, and they have recreation, so it's a nice small-town community in the West. A lot of these Western towns don't have that anymore.

Is it true that some of the people who work in the Carlin area come from Elko? They commute?

Oh, yes, but they've been bringing a lot of people in there, particularly with this underground mining. I think Elko is a really nice community for its size; it has a very good mix. Now, you take Aspen and Vail, Colorado—all you have is billionaires with these million-dollar homes; or they are these service people that are living in mobile-home ghettos down the highway fifty miles away, and they are in very low paying jobs. You don't have anybody in between. It's not a good situation.

It's interesting that, in the fifty years since you graduated from college, you've seen such a big change in the mining industry.

Oh, yes. Tremendous.

From when it was prestigious to where it's a struggle just to be understood?

Yes. Well, I think we've done a pretty good job on the whole, although, I admit we did things that we probably wouldn't do today. We don't think we messed things up too

much, but I guess a lot of people think we did.

OK. That's all the questions that I have. Thank you for your help with our project. I appreciate it.

Great.

PETER N. LONCAR

VICTORIA FORD: *It is October 27, 1998, and my name is Victoria Ford. I'm here with Pete Loncar at his home in Montrose, Colorado. We're going to be talking about the Carlin Gold Mine today. Pete, I'd like to start with a little bit about you and your family background. Could you tell me, first of all, your birth date and where you were born?*

PETER LONCAR: Yes, I was born on the fourth day of April, 1920, in Goldfield, Nevada. I went through the twelve grades of school right there in Goldfield. And I'm one of nine children.

Your whole family was raised there?

Yes.

And was anyone in your family involved in mining?

Yes, my dad and then two of my brothers.

And tell me what they were doing.

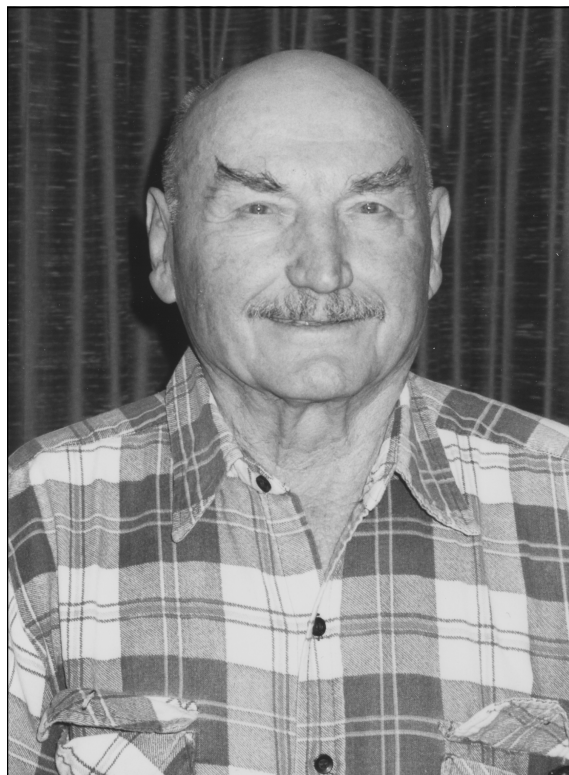
Well, Steve and Bob worked for Newmont. In fact, they worked for me when I was foreman there on a couple of prospects. And my brother John didn't get too much involved in mining, as far as operations go. He was with the power company most of the time. He did go out in the hills prospecting quite a bit, but he never found a mine.

What did your dad do?

Oh, my dad worked in the mines, and he also worked for the water company there for years. He worked in a little town called Lida, and his job was to gather the water from the various springs. They were all channeled into one pipeline that went into a couple of pump stations and pumped into Goldfield for their domestic water.

Do you remember any of the names of the mines that he worked in?

Yes. He worked at the Laguna Mine. And he worked for Five-to-One shaft, there, for quite some time, but this was during the depression times. And, gee whiz, there was



Pete Loncar

a period, there, when they couldn't pay. He got stock in mines. But I have some of those certificates on my wall there. They're not worth the paper they're written on, but in those days you could get away with that. Now, he did a lot of assessment work for companies and was never paid, and it was difficult those days. But since then, they've got laws that you can't do that anymore.

Well, and with nine children I would think he couldn't afford to do that kind of work.

Yes, but we had a little dairy, see, and we sold milk there, and we sold butter and buttermilk and cheese and things like this. And we had eggs, because we had a lot of chickens, and we had a bunch of goats, also, that we sold. Every once in a while we'd sell those. People would come from out of town, actually, for little goats, because roast goat was quite a delicacy.

So anyhow, between him working and us kids helping out, we kept the family going. We always shared at home, whenever we got a little job. Sometimes you'd get two bits to clean somebody's yard or something like that. And my sisters, who are all older than I, worked. Some of them waited on tables; some of them were clerks in the courthouse and things like that. They all helped keep the family going.

So everybody had to work.

Everybody had to work, yes.

How old were you when you started working? Do you remember having jobs like cleaning up?

Oh, yes. When I was in high school, gee whiz, I worked for a tinsmith making ventilation pipes for the mines there. God, I'll bet I made ten miles of various-sized ventilation pipes, from twenty-four-inch diameter down to eight-inch diameter. And for two dollars a day. You could imagine—two dollars a day. And boy, oh boy, you worked like crazy. And that was just weekends, like Saturday and Sunday, and then I went to school. Then I got a job in a theater. I swept out the theater and ran the machines for fifty cents each night, and then I got to see the movie. So that was something. We'd get a chance to run the machines in there. I thought that was pretty neat, myself.

At that point, when you were going through school, did you have anything to do with the mines? Did your dad ever take you to see them?

Oh, yes. When I was in high school I used to go out and run the hoist and pull some of these guys out of the mine—my brother-in-law for one. That's how I learned how to run hoist, see, which later proved to be a big help,

because I went to work for Newmont on the same hoist.

Was it a particular brand?

It was a Hendre Boltoff hoist. It was double drum, because it was a three-compartment shaft, and so they taught me how to run it, and it saved them climbing out, see. Usually, about the time that they got out was when I got out of school. I'd go around there. And sometimes they beat me out. If they had to come out and sharpen steel or something, they'd come out a little early, and one of them would climb out and pull the others out. But, really, I did learn how to run hoist.

Was it difficult to learn?

No. In those days you learned fast, anyhow. They weren't complicated like lot of the things are now.

It was run by electricity?

Oh, yes. The one on the Florence was, I think, 120 horsepower motor and double drums. The one on the Laguna was a lot bigger. I think it was around 150 horsepower, double drum hoist.

So, the Laguna and the Florence were the two mines where you worked?

Well, that was later on with Newmont that I ran those. But those were the big hoists in Goldfield.

So, you had actually been underground, then?

Yes, I'd been underground a little bit. I'd go in there with my brother-in-law, Ben Baird, and he showed me what he was doing and that, of course, was in those days when you had carbide lamps. It was kind of in-

triguing to be under there and see those old workings. Ben knew the history and where a lot of the big stopes, rich stopes, were. He showed me that, and it was quite interesting. Then, of course, I got into doing the mining after I graduated from high school in 1937.

When I was a senior in high school, I was picked to go to Reno for a state typing contest, and, of course, I didn't have the money. At that particular time, there was an electrical contractor from Tonopah, Nevada, name of Arthur Cox. He got a contract with the water company to put in a power line from Goldfield to the two pump stations that were pumping the water where my dad was getting it.

We were on Easter break, I think. We had a week, and I told my mother I was going to run over the mountain and see Arthur Cox and see if I could get a job of some kind, so I could go to this contest in Reno. So, I did. Boy, I ran. There was about three miles to where he was over the mountain, and they were just quitting.

It was kind of strange. I saw the foreman. I asked him if he had a job of any kind, and he said, "Well, the big boss will be here in a few minutes to pick us up, and you can talk to him."

Then Art came over there, and I asked him if there was anything I could do, that I was going to go to this contest, but I didn't have any money, and I was willing to do anything.

He says, "How'd you get here?"

I said, "I came over the mountain."

He said, "You mean to tell me you ran across that mountain?"

I said, "Yes."

He said, "Well, you must want a job pretty bad." He said, "You meet me at the hotel in the morning." And, by golly, he put me to work. I worked as a lineman's helper for him for that week, and he paid me five dollars a day for seven days. I got \$35.00,

and I'm telling you, I felt like I was a millionaire. And I had a chance to go to Reno for the typing contest.

The typing contest—how did you come out with it?

Oh, I come fifteenth, I think. [laughter] It wasn't very good, but the problem was that they put me on a Royal typewriter, see, and I learned on an Underwood. I had a devil of a time finding the shift key. And, of course, everything's blanked out. You have to know them, but the heck of it is, if you make a mistake, that counts against you, so I didn't do as good. But I wished I'd had an Underwood. I'm sure I would have done a whole lot better.

What were you trying to earn, by entering this contest? Was there a scholarship or anything?

No, there was no scholarship. It was just something that the school had.

Oh, just a competition. Yes.

But that whole thing helped me, because when I graduated I sent Art Cox a graduation announcement. And I went to work the day after I graduated. I went to work for Arthur Cox in Silver Peak. He said, "Instead of giving you a gift, I thought I'd give you a job." So he went to Silver Peak, and he had a contract to put a power line in from Silver Peak to Nivloc. I think it was twelve miles. So I worked for him almost that entire summer, and then helped up there putting in the transformers and all that sort of stuff. Then, when he was finished up there, I got acquainted with the foreman at the Nivloc, and I went to work for the Nivloc Mine, at the time. I was going to go caging underground.

What is that job?

Well, that's where they run cars on cage, and they'd hoist cars instead of a skip. A skip, you'd dump out of a pocket into a skip, and then it dumps by itself on the surface into a pocket. They have to cage the cars. It was a double-deck cage for two cars. You run a car in on one deck, and you close the gates on it. And then, you either raise or lower a cage, and you cage the second car on the upper deck, and then, you hoist them.

But that night, before I was to go down there, a kid got hurt. He was working in a gassy place, and as they were pulling him up the shaft, he passed out. When he passed out his leg dropped between the cage and the timbers, and it tore his leg off right at the hip. The next morning when we went up there, there was this big pool of blood where they had laid him down, and they rushed him to the hospital, but he died because of loss of blood, and that scared me out of going underground.

So I asked that foreman if he had anything else. He put me on a bull gang, and believe me, that was an education. That's where you do anything and everything on the surface—but just common labor. This was in 1937, and you couldn't hardly buy a job. There would be a string of a couple hundred men all lined up every shift looking for work. And believe you me, you worked. If you didn't work, it was down the hill you went. That was one of the toughest things I've ever seen in my whole career, how hard you had to work for what you got. See, I was getting four and a half there. I'd a got better than that. I'd a got, I think, five and a quarter, or something like that, if I'd a caged cars underground. But I took that less money for probably a little safer job on the surface, because I was brand new on that night. That scared me when that kid lost his leg, so I stayed on the surface. But believe me, I learned a lot. I learned how supervisors treated people, and that came in real handy afterwards when I got supervising. If some-

body came up to me and told me he had a problem and what the problem was, I'd know whether he was telling the truth or not, and I'd go along with it. But when I first went to work there, we had to lay this sewer tile—this concrete tile, and, thank gosh, we didn't have to dig the ditches. They were already dug, see, but we had to lay this tile, and it had to be on a one-eighth-inch grade.

What's a one-eighth-inch grade?

Well, it has to be on the slope of one-eighth inch to the foot, see, so that it will flow. They went through this little hump and, gosh, it was going to go kind of over a little hill. The ditch was almost twenty feet deep going through that hill. It was kind of wide on the top, and when we were trying to get that pipe down there we had to lower by rope, because it breaks pretty easily. We knocked rocks down, and you had to shovel those rocks out and get it all done. We didn't get as much done that day, and the foreman came over there. Boy! He raised holy cane, because we didn't get as much done as we had the day before. We tried to explain to him what was happening, and he didn't listen at all. He said if you want a job, you're going to work an extra hour to make up for it, or go get your time. So, we worked for one hour extra, so that we wouldn't lose our job, and it satisfied him, but I never forgot that. I thought that was pretty doggone rough on the guys because we worked like crazy to get it done. But you just couldn't do it. It just wasn't possible. It was just impossible to get that much done, trying to shovel dirt about ten feet over your head. That's not easy.

And he wasn't willing to listen to the problems that you had?

No, he wasn't willing to listen, because . . . well, he didn't have to, because

he had 200 guys he could pick to go to work. And we knew it, so we just worked an extra hour and made up for it and just forgot about it.

Did you do it differently, then, when you worked with men as their supervisor?

I sure as heck did.

How did you do it?

Well, with any job you're apt to have problems. Things crop up unexpectedly. But if someone goes out, and if they run into a problem, you have to recognize that, and you have to allow for it. I learned that, by golly, these things do happen. I learned from experience, boy, you don't jump on guys for nothing. See, if they have it coming, that's a different story. But if they don't, well Consequently, you get along better with people. They'll do a whole lot more for you if you can work *with* them. So it was a learning experience, too.

Not only the hard work involved, but how the men were treated—that was really valuable to you.

Oh, yes. You bet. And then, see, they had the union there at that time. There was a lot of fellows come through up there from Oklahoma, and, of course, they called them "Okies," because they were from Oklahoma. They didn't have anything. Those guys were *hard up*, I'm telling you. Because I worked with several of them there in the bull gang, and when they brought their lunch out, they would have sandwiches with maybe just a little bit of mayonnaise or something between the two pieces of bread. It was really pathetic. You couldn't help but feel sorry for them. And here, I'd have a sandwich that had meat and lettuce and all this other stuff with it. That poor guy was eating, practically,

just bread, until he got a payday or two. So the unions were really getting on them, and they were dumping their cars over the hill, and, boy, they were doing all kinds of things to get rid of them. They didn't want them there.

The unions didn't want the men from Oklahoma?

No, because they were willing to do most anything, see. Underground there, I know they had these round-point shovels that were about twice the size of an ordinary shovel, and I don't think the miners liked that. And these guys were willing to work with those because they were hurting. They were hurting. I guess they didn't like them for that because they would do almost anything.

So anyhow, I worked there until I put in an application at a mill in Goldfield. But that was a plant that was running tailings from the old Goldfield Consolidated Mill by Bradshaw Syndicate. There was a fellow there by the name of Mark Bradshaw that had a lease or something on the whole works, and he had this mill that was running these tailings through. It ran throughout the depression. These fellows worked there, and you almost had to die to get an opening. But it just so happened that there was a couple that broke up, and she left town. The guy left town after that and left an opening. And, by golly, I knew the superintendent of the mill there, because, heck, we delivered milk to them for years, and he'd been there most of the years that I lived there. So I knew him real well. He went up to the house and told my dad and mom that he was looking for me and that I had that job if I wanted it.

Boy, I came out of Silver Peak as fast as I could, and I went to work there, because then I was home, see, and I got out of that environment of those union guys and that bunch, because that was scary. I had an Okie that was my roommate, when we got into

the bunkhouses. At first, when you went to work you slept in a Paramadal tent, and in the middle of winter, a Paramadal tent wasn't all that warm. So then, you took your turn. As the guys moved out of the bunkhouse, you got into the bunkhouse. Well, I got into the bunkhouse, and an Okie was my roommate, and, of course, they were going to go after the Okies. Boy, I had to get out of bed a couple of times in the middle of the night when I heard them talking, because our room was right next to the rec room, and you could hear them talking in there, because they were drinking and talking real loud. I had to get up and tell them, "Hey, there's nobody in this room but myself, and I'm not no Okie. I'm from Goldfield."

And there were a couple of guys working there that were from Goldfield, and they knew me. They said, "Well, we're not going to bother you. Don't worry about it."

But I wanted to get out of there. It was rough. I kind of felt sorry for those people, because, if they had had anything at all, they probably wouldn't be as willing to do some of the things. But when you're hungry, and you got kids, and you've got to feed them, you're going to do most anything. I'll tell you, anybody that hasn't gone through that period just doesn't understand how tough it was. Because it was tough.

To not have money, to not have food. To not have a steady job.

And where do you go? If you could go somewhere and find one, it would be a different story. But it was tough. It was really difficult.

So, you jumped at the chance to go back to Goldfield for a steady job.

Yes. Oh, that was good.

What did you do at the mill?

Well, I went to work as a helper, and that was on the filters. They had these big Butters filters, and I was a helper there. It wasn't very long before one of the filter men retired or quit, I'm not sure which, but anyhow, I was promoted to a filter man. At that time you got five and a half a day, which was real good money. And for a kid, why, that was great. Big money was never heard of till after the war.

Boy, I'll tell you, five dollars was a standard, really, for any kind of work that you had to have some kind of a skill with, and common labor was usually around four and a half.

As a helper, what did you do?

Well, you greased the equipment. You had to help with anything that come along—if they had a problem in the mill or anything. You'd have to go help tear down a pump or something like that.

So, it was mostly maintenance?

It was maintenance and things like that, yes, and also helping the operation of the mill. That was a good job, because everybody there had been there a long, long time, and most of them I'd known most of my life. It was a good, pleasant job. I really enjoyed that.

Was that the first place that you learned the inner workings of a mill?

Yes, that was the first mill I'd worked in.

It was a cyanide mill?

Yes. They used hydraulic monitors, and they'd sluice the tailings, because these were tailings that had been through a mill once before. Gosh, they were as much as fifty feet deep out there in the tailing pond. So they'd

sluice that, and then they'd pump it up into the mill. They'd agitate it and add their cyanide and so forth, and then filter it.

What does that mean—sluice tailings?

Well, they'd use these hydraulic monitors with about, oh, a hundred and seventy-five to two hundred pounds pressure per square inch of water. That would be a nozzle of about an inch, inch and a quarter in diameter, and when that hit those wells, it would just almost melt that material. Then, it would flow down as thick mud. They would pump that with rubber-lined pumps, big pumps—they were sixteen-inch pumps. They'd pump that into the mill and into these agitators, where they'd agitate it and mix it with cyanide and then filter it. Then, they'd use their same Merrill-Crowe system of precipitation. They didn't melt gold there. They sent the precipitates out.

But that was a good job. We would operate until, oh, a week or two before Christmas, and then during the real cold months they would shut down, and we'd usually go on vacation for a couple of months. About the first of February, they'd start maintenance work, and they'd go through the whole plant overhauling and maintaining equipment for the next season. Then, we'd start operations in April or something like that, and we'd go clear through until December again. But see, those days you worked seven days a week, and there were no holidays. There was no time and a half those years. There was none of that. You just worked straight time.

The mill operated twenty-four hours a day?

Twenty-four-hour days. We worked shift work—two weeks day shift, two weeks afternoon shift, two weeks graveyard. We just went along in cycles like that. But that was a good job. I didn't mind that at all. Then, usually, when we had shut down, we'd all

end up at the Rose Bowl or something. [laughter] It was great, because you'd get a big group together, and you could have a lot of fun. That was our vacation time for the whole year.

And tell me again the name of that mill.

The mill was Bradshaw Syndicate.

And how long did you work there?

Let's see, from 1938 to 1941. In 1941 they shut down, and they were moving the mill to Miller's. They were going to run the old tailings from Miller's, which is about five miles north of Tonopah. I didn't want to drive that thirty miles to go into work every morning, and I didn't want to move and live in Tonopah, so I quit them. I got a job as the under-sheriff in the courthouse, so I was there until I went into the service.

When did you go into the service?

I went in the third day of December, 1941. Just four days before Pearl Harbor. I was at Fort Douglas, Utah, at the induction center, and I never will forget that day. I was at a movie; I saw *The Thin Man*. We got out of the movie, and there were more MPs out there than you could shake a stick at. Everybody that was in uniform kind of whispered, "In the bus, in the bus, in the bus!"

There was a guy hawking newspapers out there hollering, "Japs bomb Pearl Harbor! Japs bomb Pearl Harbor!" Oh, we knew that war had started. It scared the pants off of us, because they went from Salt Lake back to camp with dim lights, and everybody was kind of whispering, and yikes! [laughter] It was kind of scary.

Well, anyhow, we left right away, of course, from Fort Douglas to Camp Roberts, where I took my basic training. I was in infantry. See, I was color blind. They tried to

get me, when I first went there, to go in the air force as an observer. But to go to the air force, I would have had to sign up for three years, and I told them, "To heck with that." I had a job; I didn't need a job. I was just going to put in my year and go home. But boy, oh boy, was I mistaken!

How long were you in?

Almost four years.

Where did you serve during the war?

South Pacific. It usually took sixteen weeks of basic training, but we took it in ten. Boy, I'll tell you, they got us up real early in the morning. We were going till way after dark. They shipped us to Fort Ord to fill out the Twenty-Seventh Division. I went overseas with the Twenty-Seventh Division. We were supposed to go to the Philippines, but we couldn't make it to the Philippines. At least, that's what they told us. The sea lanes were cut. We'd gone past the Hawaiian Islands. We stopped there, but then they turned us back, and we landed on Maui. Why the Japs didn't take it, I don't know, because there was nothing there. We were the first troops there. Boy, then we really fortified those islands. We wrapped that whole island up in barbed wire. I hadn't see barbed wire like that before. My God, you'd just look at it, and it would stick you. And then we built all those fortifications—put it pillboxes and machine-gun nests and all that around those beaches. But we didn't ever have to use them.

Being that I had worked on power line and for Arthur Cox and that, I was in a signal corps. We put in enough telephone lines all over the island, so that all the outposts were connected with telephones and that. And we had our radios. At that time, the Hawaiian Islands were under martial law, and nobody could get out in the water unless they had some kind of a permit.

We were watching, because there were some spies there. They told us that they were sneaking information to the Japs. They'd come out there with those submarines. So anytime we saw a boat out there at all, we'd give them the position, and they'd go out and intercept it. They told us they caught a few of them, but we never did see them.

Were you there in Hawaii the whole time?

Oh, no. We left from Hawaii, went down to Guadalcanal, and from Guadalcanal we went up to New Britain, Airoway Island, and we went up into the Philippines.

So, you saw action in the Philippines?

We made the beachhead. See, when we were in the Hawaiian Islands they broke up the Twenty-Seventh Division. When we went over it was a square division, and then they streamlined it to a triangular division. Our regiment was taken out of the Twenty-Seventh and put in the Fortieth. That's when we went down Guadalcanal and those places. We were the Fortieth Division. We made the landings at Lingayen Gulf, and then the Hundred-Eighth Division took, I think, Negros and Sebu and went on down to Mindanao. Most of us had enough points to get home long before we went, even in the Philippines, but they couldn't get replacements or something. At least, that's what they told us.

Then, when we finished the campaign on Mindanao, we were heading back to the beach. When we got to the beach it was so much mud. My aching back! It was knee-deep. I was sleeping between the hoops on one of the six-by-six trucks to stay out of the mud. The first sergeant came by and called my name. I said, "Here I am, up here."

And he said, "You want to go home?"

I said, "What are you talking about—" "You want to go home?"

He said, "Well, you guys that are being picked are going home."

Man, I jumped off of that truck, right into the mud up to my knees! [laughter] We were right close to the water, so I run out there and took a bath in that salt water and passed out all the stuff I didn't want. We got on a little LCI [Landing Craft Infantry] and went to Leyte. We were supposed to pick up a boat in Leyte to go home, and that was quite an experience. That's the first time I saw WACS, was on Leyte Island. We'd read about it and everything, but we never saw them. But they had some WACS there. It was kind of interesting.

So then you went home. What year was that?

That was in 1945.

Was everything over by then?

Oh, no. See, I was sent home on a 45-day leave. I was supposed to go back. Our outfit was scheduled to hit Kyushu Island in Japan on the first of November. Anyhow, we came home, and it was kind of foggy that day. When we could see the Golden Gate Bridge, I'll tell you, there wasn't a dry eye in that bunch. Everybody screamed until they couldn't talk anymore. It was fantastic! Well, we never thought we'd see it again. So it was really something. Then, anyhow, I got home.

I hadn't been home but only a couple of days, and there was a fellow there in town that used to be the superintendent for the Goldfield Consolidated Mining Company. He had heard that I'd come home, and he came up there and said to me, "We have a diamond-drill rig drilling down here in the flats, and we need somebody bad to help."

I thought, "What in the hell? Man, I can't go to work now." I said, "I haven't been home in almost four years. I don't want to go to work."

He said, "There isn't an able-bodied man that could be found." See, everybody was in the service or gone to lucrative defense jobs. There wasn't a man around. He almost begged me to come, even if it was just a week, to help. He said, "They pay ten dollars a day."

Ten dollars a day—I had never heard of such wages. I thought, "Well, I'll go for a week." So I worked a week on this drill. And at that time, when I came out of the service, I only weighed 128 pounds. Some of the food that they fed us, a coyote wouldn't have eaten. Anyhow, I was down to 128 pounds, and I was having trouble breaking the drill rods because they get tightened so tight. That guy was giving me holy heck for not being able to break those rods, see, and I told him, "Hey Mister, I'm just trying to help you. If you aren't happy, I'm tickled to death to go home." Well, then he'd break the rods, and I spent most of my time drilling rods, because the ground was bad. He was cementing, and then he'd cement the rods, too. I'd have to drill the cement out of the rods.

But yes, I worked for him for a week, and then I quit, because I had Naomi coming. She was in Maryland, and I asked her to come, and we got married. That was the twelfth of August when we got married, and we left. I had a sister, who was in the marines, but there was something wrong with her, and she was in a hospital in Treasure Island out of San Francisco. So we were headed that way on our honeymoon. We got there, and I went to the hospital and inquired about my sister. They told me that she was just discharged the day before. They had just told me that, and all of a sudden, all hell broke loose. People started screaming and hollering, and sirens were blowing and everything. I thought we were being bombed, for a minute. And they said, "Japs surrendered!"

"Holy smokes! Hallelujah! I may not have to go back." So, anyhow, I ran back out in the car and told Naomi, "The Japs surrendered! Maybe I won't have to go back."

Because, see, before we got married, we talked about it. I had told her, "Well, we can get married, but I've got to go back. I may not get back because, after all, I'm in the bloody infantry." And I said, "If we hit Japan, it's going to be tough."

But she said, "Well, let's get married. Even if it's for awhile, we'll have something, anyhow. Better than nothing."

So, we got married. That was a good thing. Anyhow, we were real happy after that, and I didn't have to go back. I got a telegram from the army that said I could go get my discharge right away or wait till the forty-five days were up. I told Naomi they owed me a vacation, anyhow, "I'm going to wait till my forty-five days are up."

So anyhow, we saw my sister. And that day at San Francisco, that VJ DAY, was really something. They like to tore that town up. And Market Street, there was no automobile left upright. They tipped over street cars, anything, on Market Street. They were wild. My gosh, there were women bathing in those little fountains. [laughter] It was a riot. What a celebration! But anyhow, we went on up to, I think, Eureka in California and went through the Redwoods and all that and then came back to Goldfield.

You said some terms that I'm not familiar with, "bricking the drill rods?"

Breaking. Breaking them. Yes, where they're coupled together. They get so tight in the drilling process that they have a little trouble breaking them loose. And I just didn't have the strength to break them.

OK. And then you said "cementing the rods." What is that?

Well, you see, you get voids underground, where you lose your circulation and that. Then they pump cement down the hole to cement those cracks, see. But when you do that, you're supposed to wash your rods as

you pull them out, to wash the cement out of the rods so the cement doesn't set up in your rods. Well, this guy wasn't doing that, and when he pulled the rods out, why, the rods were full of cement. And it set. Then, I'd use a sharpened tool, and you have to use a hand drill and drill that cement out.

So, you went back to Goldfield, and now you're married and have a wife. How did you guys start out after that? Did you go back into the mining business?

Well, I went back to see that guy about the drilling, and he told me that he didn't need me. He got a guy to help him, but that didn't bother me. My brother was called into the service. He was working on the railroad—a conductor on the railroad. They had called him to go in the service, and he had quit the railroad to go in the service. Of course, I knew those people from the railroad, too, living in that area all my life. They told me to come to work for the railroad. So, I went right to work on the railroad, right after we were married. That was on the T & G Railroad, the Tonopah and Goldfield Railroad, and that ran from Goldfield to Mina, which is a hundred miles. On the railroad, a hundred miles is a day's work. So, we would go to Mina and lay overnight and go back the next day. Now, later on, they changed that, and we would make a round trip in one day, and then we wouldn't work the next day. So we took turns. There were two crews, and one would go one day, and the other the next day. That worked out real good until after the war. See, they were supplying the Tonopah air base, so they had long trains of gasoline and supplies for the airbase. When the airbase closed down, why, there was no more business for the railroad, so they shut it down and tore it out.

When I took the last train out, why, I told Naomi, "Well, I guess I'll have to go rustle the mine," because Newmont had started the Deep Mines Operation in Goldfield. They

had started just a short while before that. I didn't know it was Newmont at the time. All I knew was that they called it the Deep Mines Operation.

I told Naomi, "Well, I better go rustle." And while we were eating dinner, there was a knock on the door. I went out there, and it was old Martin Duffy, who was the county commissioner there, and a guy I'd known all my life. He worked with my brother-in-law, Ben Baird, when they were leasing, and they were the ones that I pulled out of the hole on the hoist.

He told me, "I heard that you took the last train out."

I said, "Yes."

He said, "Well, I'm running the hoist at the Florence." And he says, "I don't want it. You've run it. So," he said, "If you want the job, you go see a fellow by the name of Dellinger," who was the superintendent, "And I'm pretty sure you can get the job."

Well, right after supper, I went and saw the guy, and he said, "Sure, come out in the morning."

So, I didn't lose a shift. I went right to work, from the railroad to the Deep Mines Operation as a hoist man for Newmont. That was the first day of October, 1946.

So, all of your experience in mining and milling, you've gotten on the job, is that right?

Oh, yes.

And you worked with Newmont, then, how long?

Until October 1984. I started there on the hoist at the Florence Mine. I'd run that hoist before, so it was no problem. It worked perfect. I can't tell you how long I ran that hoist, but they built the mill, and I had the mill experience with the Bradshaw, so they asked me if I wouldn't take the job as a foreman in the mill. My brother, Steve, had the

other shift. We worked twelve hours. Steve was twelve hours, and I was twelve hours, and we ran that mill for awhile, but that got kind of old. Working twelve hours got kind of old, and I left that job. I told them I didn't want that any longer, and I went back to the hoist.

At that time Newmont was doing some work in Candelaria, which was an old mining camp, oh, just a little bit south of Mina. They'd finished the work there, and they needed somebody to tear the camp out. Well, they sent somebody over there to do it, and I guess it took them a whole lot longer than they thought it should have. So I told them, "Heck, if you need somebody to clear these camps out, I'll do it for you." because I was pretty handy with the equipment, anyhow, so it didn't bother me. When they brought that one load in, they sent me out to finish the job. Then they made me a foreman. They shut the mill down in Goldfield, and they transferred us from the Deep Mines Operation to Newmont Exploration. I was in Newmont Exploration until . . . I'm not even sure of the year. I was still stationed in Goldfield.

But you were in a different part of Newmont Corporation?

Yes, that was just bookwork, see, as far as transferring goes. Newmont did the Deep Mines Operation, so I just went from one title to another. I didn't have to change any stations or anything. That summer they started operations in Seligman Canyon, and we worked in Candelaria again, and we worked at Groom—we sunk a shaft in Groom. That was just before the army took over Groom as a test site. We worked there, I don't know, several months, sunk a shaft and did some work, and then we left there. But it was getting to the point where it looked like the army was going to take over the whole thing, so they didn't lose much time in that place.

But anyhow, I ran those little jobs for Newmont in these various places. All I did, more or less, was just make sure that there were crews there, and the equipment was taken care of, and took care of the time, and just oversaw the work. But I was on the road most of the time, because these were so scattered. They were, gosh, at least a hundred, a hundred fifty miles apart. So there was a lot of chasing around to do. But I still maintained the headquarters in Goldfield, because we had the shops there—blacksmith shops and all that. The supply base was in Goldfield.

Then, they transferred me here to Montrose, Colorado, because they were going to get out of Goldfield, and we moved most of the equipment and everything here to Montrose. I came here, and my two brothers came with me. They were working for me, because they were working as miners in Candelaria and Ophir Canyon. So, they came here, and we built the shops down here on North Ninth Street, and warehouses and so forth. We put up a couple of buildings for an office and that. That winter, just before Christmastime, why, my two brothers left the company, and they stayed in Goldfield. One went to work for the highway department, and the other one went to work for the power company.

I stayed with Newmont. I was still foreman, and I got involved in the uranium, then, here in western Colorado and eastern Utah. And, oh, I ran a job up in Hot Sulphur Springs. We ran a long drift there, prospected for uranium. Uranium was the hot thing at the time. I did work down in New Mexico around Grants. Then, they sent me up to Spokane, Washington, on the Indian reservation up there out of Ford, Washington.

A couple Indians had a showing of uranium on the Indian reservation, so one of the fellows that they contacted knew Fred Searls, and, of course, Fred Searls got ahold of Bob Fulton and wanted somebody to go up there, so they sent me up there to do

some drilling. At the same time, the Indians had a contract with the AEC to ship 500 tons of uranium ore to a facility in Utah. I'm not sure just where that was in Utah, right now, but I went up there with their chief geologist and another geologist. That was really my first time mining uranium. I'd drilled hundreds of holes all over the country and did bulldozer work and all that sort of stuff, but I'd never actually mined it.

So, I went up there not knowing just exactly what the rock uranium looked like, but it was fluorescent. That autenite would fluoresce. I'd go up there at night and scan that whole area and mark it out with stakes, and the next morning I'd go out there and mine it. We finally shipped all that 500 tons. Then, there were a couple of leases there that they didn't have that they wanted real bad to go with what the tribe had, because these were local Indians, or individuals, that owned these lots. It was just a parcel of land, anyhow, that they had. They put the leases up for bid, and Newmont bid on them, but they didn't get them. There was another company from Utah. I think, it was Uranium Minerals, or something like that, that got the contract. Well, I knew their general manager. I'd met him when I was drilling. He came out there and looked at it, and he asked me if I'd show him around up there, which I did. He said, "Well, it looks to me like all we got was a sheep pasture." I told him where we drilled along that border, and I told him we hadn't really found anything spectacular. So anyhow, they turned it down. Then the Indians put it back up for bid, and Newmont bid on it and got it. When they had that, then they had that whole area. I drilled that, also. And then, I stayed up there as a mine superintendent for Dawn Mining. They formed a company called Dawn Mining Company to mine that, and I stayed on as the mine superintendent.

Tell me some of the things you were learning during all this moving around.

Well, we learned a lot about drilling with the various companies, but we'd always have to hire a contractor to do the drilling, because the company at that time didn't have their own drills, so we had to contract, but we learned how. We learned very much how to sample and watch what was going on and the business of how to really find an ore body, what to look for, and all that.

Was there something specific that Newmont did in terms of sampling and finding ore bodies that was specific to Newmont?

No, I don't think so. Usually, the geologists would find an area that they thought was right. That's where I came in as an operator, and I'd go do the drilling and all that sort of stuff. Then, if there was any mining to be done, I did that. If there were shafts to be sunk, or adits to be driven, or anything like that, that's what I did, because I had expertise in that. I'd done quite a bit of that over the years, through the different operations. You learn how to handle men and what to expect out of them, and what to expect out of the equipment. It was all a learning process at that time, because I was young and just getting started in the game. So I was willing to learn anything I could, and I wasn't afraid to tackle anything. That's just the way I was, and that helped me. I'd done mechanical work, and I knew how to overhaul equipment, if it had to be done. I'd done quite a bit of electrical work, so I knew how to go set up electrical generators and set up power. I'd hook up the various pieces of equipment like your blowers and fans and pumps and all that sort of stuff. So I could do that without having to hire a lot of specialists to do it. For a small operation, why, it paid off. So, it was all a learning process.

You mentioned Fred Searls and Bob Fulton. Tell me what their jobs were when you first started to work with them.

Well, Fred Searls was President-CEO of Newmont. But Fred Searls was a geologist at heart. I don't think he ever quit geologizing. He was always out looking at rocks and everything. When we were in Goldfield working for the Deep Mines Operation, Fred visited the operation very frequently, and he always went underground. When he dressed up in these old diggers you'd never know him from a miner. That's just the kind of a guy he was. I got very well acquainted with him running the hoist, because he'd have to wait for the skip. He'd be in the hoist room, and we'd talk about various things. I got to know him pretty well. While I was there, he would visit sometimes, like on the holidays. He'd come to the house, and he'd want me to put him down some shaft. So I'd tell him, "My gosh, Fred, where you going to come out at? I'll pick you up. I'll go hoist you up."

"No," he said, "don't worry about it. I'll climb out." He says, "I don't know where I'll come out at." He used to take extra lamps, extra carbide, extra water, and he'd be gone all day long prospecting down doggone old diggings all by himself. And then he'd come out. He was about as down to earth a guy as you'd ever want to meet. You couldn't help but like the guy and admire him. I went up to the mine and got some timber one time for the Fourth of July nail-driving contest—a women's nail-driving contest. I had these six-by-sixes. I had an old Model-T Ford, and I had them all along the side. I drove down to where this contest was going to be by the Elks Building, and here was an old guy sitting on the sidewalk there reading a newspaper, and he looked like an old bum. When I pulled up there he saw me. I was unloading those six-by-sixes. He jumped up and came over to help me—it was old Fred Searls. [laughter] I was surprised to see him. He had been waiting. He said, "Oh, I knew you'd be coming by here." He said, "I want you to put me down some hole there." So I did. But he was great.

Old Bob Fulton was the vice president in charge of exploration. Both these guys were based in New York, and Bob was kind of an understudy of Fred's. Over the years, I could see a lot of the same traits in Bob as I saw in Fred, because both of them were workaholics. Time didn't mean anything to them. It was fantastic to be associated and work with people like that. I really enjoyed them. It was great. Fred, of course, used to visit these prospects that we had, because they usually were ones that he had picked, and he was always interested. He'd come out and eat lunch with us, usually, if we were at a camp, or we had a trailer. The wife always fixed lunch or dinner or something, and they would eat. He used to tell some great stories of his experiences over the years, and it was just great.

So, here's the president, the CEO, and he didn't sit in his office in New York. He liked to be out here underground.

Oh, yes. He'd rather be out there. He hated to have to go to that office every day. It used to get to him to have to be there all the time. So he'd say, "Well, I can only go at times. I can get away sometimes. It's a holiday when nobody's in the office." So he'd take off. [laughter]

Old Bob was that way a lot, too. Time didn't mean anything to him. But I don't know, I enjoyed working with them, because they were such great individuals. You couldn't help but respect them.

They weren't always on hand, though, when you were working with them, since they were off in New York.

No, I'd only see them sometimes, maybe once or twice a month or something like that.

What did that mean for you, in terms of the job? You were in charge?

Oh, yes, I knew what I had to do, so I just did it until they told me to stop. If I was driving a drift or something like that, I used to take a little Brunton compass and map any adit that we were doing and everything else. I sent a report every month to New York on what I was doing and everything that was going on, so they pretty well always knew what was going on. They had a drawing of the work, and they'd come out. Old Fred would geologize it, or if he wanted to cross-cut, he'd say, "OK, run a cross-cut here." That was about the size of it. But I was mostly on my own. And that didn't bother me. I got used to that, and it didn't bother me, at all.

It's obvious that you enjoyed your work, too.

Oh, yes, I enjoyed it very much, because, in the first place, I was on my own. Any time you have an operation going, there are always problems that come up, and you have to solve them, and you have to solve them, usually, by ingenuity. You have to figure out what's wrong and go ahead and fix it. I kind of enjoyed that. Like I say, I'm not an engineer, and I'm not a geologist, but I bought books on it. If something stumped me, I'd go home at night, and I'd have to work on that till I could get it solved. Then I'd go out the next morning and do it. Some of them thought, "Boy, this guy's really good—he knows all this." [laughter]

They didn't know you were studying at night?

Yes, right. So it was kind of a challenge, and I loved those. I like a challenge, and it was just something that I enjoyed doing. Those kind of things don't bother me. I can usually solve any kind of a problem that comes up, as far as work goes.

And every mine, every situation, had something different.

Oh, yes, and that's what made it so interesting, see. In different parts of the country, you have to go, and you have to hire guys, and you don't know a soul, and you have to kind of figure how they're going to work in there. Pretty soon you get to know, by talking to a guy you can size him up pretty good, whether he is going to be a good man for you or not. It's just kind of an instinct, I think, that you learn after a while. You develop that. I'm sure of that. I've had pretty good success with that. There were people that I wouldn't hire, because I didn't think they'd be that good. A lot of them drank too much. You don't want somebody out on a job that drinks too much or can't get along out there. You don't make mines in the city; you're out in the boonies. It takes a certain sort of individual that can take that and stay out there with you, because a lot of them just like to put in a day's work and then go to a bar—that's their life. But when you're out, maybe, fifty, sixty miles from any kind of a bar, you can't run over there every night. Besides, most of them didn't have transportation, and so they were stuck for that length of time.

You're out away from the rest of civilization. If problems develop between people, I imagine you have to deal with that, too.

Yes, but really we didn't have too much problem. If they were married and had their family there and had a little trailer they wanted to bring along, that was fine. That was up to them. We tried to furnish them with the power in there and the water and all that sort of stuff. It worked out pretty good.

Let's talk about your family a little bit. You're married now, and you had some kids coming along, probably. How did you deal with your family? Did they live with you?

It depended on the operation, where it was, and how long it would last. Now, on a lot of the operations we moved right in. We had a trailer. The company had a trailer, and we moved right in on the property and lived there, and it was no problem. If it was a place where I had two and three operations going at the same time, then we'd have the family in one central location. When the kids were going to school, they'd have to be where they can go to school and that. They didn't have buses those days.

Oh, they didn't? You took them back and forth?

Well, usually, Naomi would take them to school, if it was any distance. If not, they walked. All the kids did, those days. It wasn't anything new. That's the way it worked. When we were down in Blanding, why, they lived in Blanding, and I was up at the mine, because we had a boarding house up there and bunk houses. I stayed there and worked ten days on and four days off. But I usually went to Blanding once or twice a week for supplies, because there were groceries and things you had to get, and mail and that sort of stuff. But it was just downtown and back. On weekends, most of the time I'd be looking for men, because miners are bums. They're a breed by themselves, believe me. There was always another job someplace where they paid more money or something. But most of the time they'd be back in a short while, "Well, that job didn't pan out," or they didn't pay like they said they would. But I think a lot of that is in their minds.

It isn't like some jobs where you hire a set crew, and they're there for the duration of the job?

Not all the time. Not with miners. Not with miners. They're constantly moving,

constantly moving. That was really one of the biggest jobs—finding miners that would stay. Believe me, over the years, yipe! I think of how many miners—my aching back!

I had them making good money. We hardly ever hired a miner at an hourly rate. We gave him a contract. If he was willing to work, he always made almost double what you would pay at any kind of hourly rate. It was always double. This was way back in the 1950s, when they would make, gosh, fifteen dollars or eighteen dollars an hour. I had guys that would take that money and go to the bar and gamble it off and wouldn't even take their clothes in to the laundry. They'd bring them back. Then they'd wear the cleanest dirty shirt that they had and use baling wire for shoe strings. And you could imagine!

They gambled it off. Oh, miners! Boy, I'll tell you, they are a strange breed. But you get some of them real good ones, like up here at the Idarado—there were guys that spent their life there. But then, that was different. It was a job that was there for years and years and years; whereas, most of our jobs were short exploration jobs. You didn't get the chance to cull your crews and keep the good ones and get rid of the bad ones and so forth.

And get families that settled in and so on.

Yes. That's right.

You mentioned that your family was very close, and yet, it's obvious that you were away from home quite a bit. How did you develop a close family with your work schedule like that?

Well, I guess, you get a good wife, why, that's the answer.

Because she has to really hold this together?

That's right. I never did have a problem that way—never. I'd be gone there just for a few days at first. And then bigger projects came and a lot of longer distances, like up at the glacier where it is impossible to take a family. She stayed in Spokane, and I'd be gone for the summer or something like that. It's so far away; it isn't something like you can run back and forth every weekend or that. It cost too much money. But I never had a worry. She took care of everything. And the checks came home; she'd sign them and send them to the bank. I told her if I ever get mad at her I could send her in for forging my name. [laughter] But I don't think the company would recognize my signature. [laughter] After seeing all hers. But, no, I didn't have a bit of problem. That was one of the great things about her. She kept the family together.

And she was supportive of your work, whatever you did?

Oh, yes. Oh, yes. Oh, yes. She was supportive of everything I did. She was fantastic.

So, we had you in Goldfield for awhile, and then you were here in Montrose, and then you were in Spokane. Where were you when you first learned about what was going on at Carlin? Tell me that story.

Well, I was up on the Brady Glacier in Alaska. We were drilling up there. There was a fellow that had found some float up there on top of a *nunatak*.

And what is that?

A *nunatak* is a peak, the top of a mountain, sticking up out of the glacier. It just so happened to be late in the year, and the snow had melted off of it. And they were in a helicopter. A helicopter landed down, and this

fellow saw this coloring and took some samples, and it proved out to have some copper and nickel. And we went up there. He got Newmont interested. I went up there and was doing some drilling in 1961.

While we were drilling up there, Bob Fulton came up there to see how the job was going, and this one time he got caught in a whiteout. Now, a whiteout on a glacier is when there is all snow all the way around you, and you get a fog—you can't see anything. In fact, all of our paths to the drills were marked with bamboo wands. Now, a bamboo wand is just a three-foot-long piece of bamboo that you put half way in the snow every fifty feet. You watch those wands, and that's how you can find your way to a drill site, because you can't see. You always go tied together, see, because of crevasses. So there's a sixty-foot rope between us, and you use a regular harness that goes around your shoulder and waist and everything, so if you happen to fall in a crevasse, the guy behind you might be able to hold you and tie you up or something till you get some help. But you never went alone. You always had to sign up at the main tent: where you were going, when you were going to be back, who was going with you, and everything else, and what you were going to be doing. They'd usually take a radio with them, so you'd have radio contact with them, because there were times, especially early in the year, when those crevasses would be covered up with snow. It would go over the top, and you could not see them. If you happened to step in it, you would go down, so it was very dangerous. But we had picked an area to put the camp that was fairly stable, and we did that on purpose, because you had too many people around. So, anyhow, Bob got caught in his whiteout, and he couldn't get out. He was there for a whole week, and he was like a caged lion, back and forth, back and forth, because he had to cancel all of his appointments and everything.

What were you living in at this point?

In a tent. Just a tent. This was a nine-by-twelve tent that we had. We had a bunk bed there, and he slept in the upper bunk. I was on the lower bunk. We had the radio. That was the headquarters there for us. He was reading all the time, and he was reading this Ralph Roberts report on that geology of the Carlin Trend. There was another fellow by the name of Vanderburg. He had one, and it was one or two others that Bob was reading. And he was telling me about this, because we had a lot of time to talk there. He would tell me about this thrust area there, where it was one plate overthrust the other there for several miles. And in places the lower plate was exposed to erosion, and in that lower plate they found traces of gold mineralization. This intrigued him, and he was telling me that if those rocks could be sorted out and really understood, that there could be a chance of finding a low-grade gold mine there that you would mine by open pit. And this was really what his goal was. He had geologists out there looking.

That winter, 1961-1962, when I got back to Spokane, I was sent with Alan Coope and another geologist to Nevada, around that Battle Mountain-Valmy area, to prospect in there and see what we could find. We spent all winter out there. I don't think there was a hole in northeastern Nevada that Alan and I didn't climb down and look at and sample and check the geology and everything else. There were a lot of interesting places, mind you, but at thirty-five-dollar gold, we'd never found anything that was minable.

So anyhow, that spring of 1962, why, I had to get ready to go back up on a glacier again. So I was up there, and I had to do some work there diamond drilling, and I also had to get a Cadastral engineer—mineral engineer—to survey the claims and get them patented, because he wanted to patent those claims, which we did. While we were up there, Bob came up, and he told me to push

the job along as fast as I could, because he wanted me to go down to Nevada and probably start some drilling on an area that they had found there near Carlin.

So I wound up that job on the glacier and went back to Spokane. I think I was there only a day or two, and I flew down to Elko. We had rented a drill from Isbell Construction Company. They were from Carson City and Reno, and they were probably one of the biggest construction companies in Nevada at that time. We had rented a drill from there, with the operator and helper, and we started drilling up there in the Gold Quarry, where the Gold Quarry property is now. We drilled there until around September, when Bob had tied up the eighty acres of Popovich ground.

Tell me about that Popovich ground.

Well, there was an old Popovich. He was an old prospector that lived up there. He had a cabin, and he and his wife lived up there, and he was doing some placering and that. But he had located and owned eighty acres of ground there. Bob wanted that, and he was dickering with Mrs. Popovich to get the ground. She was at that time kind of ill and in poor health, and he was a little worried that something might happen to her, and that property would go into an estate, and then it could take years to get. So, he worked on it pretty religiously to get it and finally got it tied up, and we moved from the Gold Quarry up there and started to drill.

Before I got there, Alan Coope had been up there. He and Mort White had located some claims just over the hill from Popovich. See, there was another property involved, which was the TS Ranch people. They owned a lot of property adjacent to the Popovich and our ground. I think Alan or Mort had put up this line of holes near the TS. Well, I moved a drill up there and drilled one hole, which was the last one down the hill, and we never did get out of the upper plate rock.

So I skipped the next hole up and jumped to the third hole. I drilled that hole, and this went down, maybe, three hundred feet, and we still didn't get out of the upper plate. So it wasn't much use drilling that anymore, because it was just shale. I skipped another hole and went up, and I drilled that one, and that hole, boy, hit pay dirt right from the top. I mean, we had a hundred feet of ore that ran just about an ounce. Man, I'm telling you, that caused some excitement when we had that, because it was almost unbelievable.

Describe what it was like.

[laughter] Well, it's been an odd day to describe.

Who was there when that came up?

Well, there were only three of us that knew, well, probably four, because Harry Treweek and his wife did the assaying, so they knew it first. And then I got the samples, and I found out what they were, and then there was Alan Coope. So I think the four of us were the only ones that knew. We got ahold of Bob Fulton and told him, and I told him I had been right next to the TS land. That was important. He knew that; I didn't have to tell him. He went down to Los Angeles and talked to the TS people and got a lease on that portion of the ground. So that tied the whole thing up. In that deal we had to work with the TS people not to disturb any more land than was absolutely necessary, and the superintendent of the ranch wanted me to put up a little dam anywhere that there might be some water running so his cows could drink, which we did. That was no problem. They came up there every so often to see what we were doing, although we never did tell them what was being found, because that was really none of their business. That was strictly us.

So, these five people—you and Alan and Harry and his wife and Bob Fulton—were the only ones that knew for quite some time?

Oh, yes. Well, Bob Fulton might have told New York. He probably told them, too, what it was.

But it didn't go outside?

It did not, absolutely, no. So then, we just kept expanding on that.

I want to go back to when you drilled that third hole, and you got this one ounce per ton of gold. It isn't like you knew right at that moment. It was sent off. It was assayed. It came back. You had to have been excited.

Oh, man! I guess! Well, we knew right off the bat that we were in different rock. You could tell that from the drill cutting. But we had no idea what was in it, because that gold is invisible. You don't see it. It's what they call invisible gold, but it's there. It's so fine that you don't see it with the naked eye.

And you'd never worked in this kind of thing before?

No. That was the first time. But believe me, when we got those assays back, it got our attention really quick. And then right away, we started expanding that.

How did you go about expanding that? Explain what you would do.

Well, we got that drill hole, and, of course, we had drilled other holes after that. Some of those started showing ore, also. Well, then you just step off from those holes, off to the sides on all four ends, and try to

keep expanding it. All of the drill holes are set up on a grid to start with, and you'll follow that grid as much as possible, because they make maps off of that. What I did, I took all that drill information home with me—I didn't even take it down to the office—because I didn't want anybody in the office to know or even by chance see some of those assays. So I took all that stuff home. I drew sections, both cross sections and longitudinal sections, of the ore body. And I kept that up with each hole. I kept drawing these, and so it was a guide for me of what to do. Shortly after that first hole was a hit, Alan was transferred to the property in Yukon Territory, so he was gone. I was left there, myself, to do most of the work, because I was in charge of the drilling. So all that was left was drilling. I just kept expanding from the drill patterns and putting it on the map, so that all I had to do was just keep going, and I just drilled the whole bloody ore body that way.

That geology is very, very complex, because over the time there, I don't know how many geologists were in there, and I've heard some horrendous arguments. Nobody can argue worse than a couple of geologists if they don't agree, I'm telling you. But anyhow, these things just kind of went in one ear and out the other, as far as I was concerned. I didn't try to drill by geology, because I didn't know what the rocks were, and I didn't think the geologists really knew what they were, so I just followed the drill. Whatever the drill told me, and the assays told me, that's what I followed. Well, that was the only way I knew, but it proved out, so I didn't have any trouble. [laughter]

So, that thing went on all the way through, and there were some areas that they didn't think would have anything at all. Just by chance, I went out there and drilled, and, by golly, I had ore. Old Bob Fulton laughed at me when I told him that. I said, "Well, they told me there was nothing over

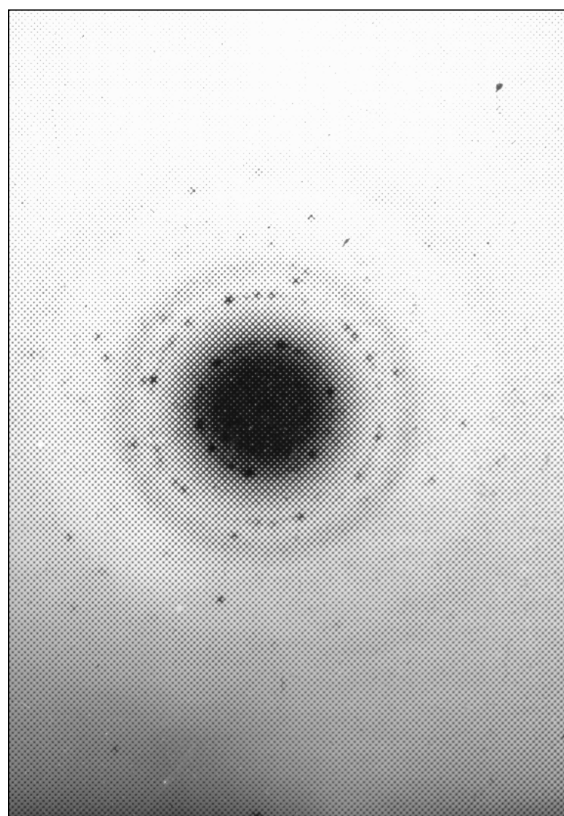
there, but I drilled a hole, and I'll be a son-of-gun if there wasn't ore!"

He laughed and told me, "Boy," he said, "you remind me of the Cousin Jacks in Grass Valley." He said, "They just follow their nose and there's ore! Once they get a taste of it, they never let go of it."

I said, "Well, that's about the way I've done with this drill."

So, it wasn't all by the book?

No, it wasn't all by the book, but I can't really fault any of them, because it was terribly difficult. You could get two rocks. They looked almost identical, and they'd be from the two different plates, upper plate or lower



"I just kept expanding from the drill patterns and putting it on the map, so that all I had to do was just keep going, and I just drilled the whole bloody ore body that way. Drilling patterns from August 1962.

plate. And it was difficult. But to be honest with you, I didn't really care which one it was from. If it showed assays, well, that's what I was after. I didn't care which plate it was from, and it worked out.

Because your job at that point was to map out and get a sense of where this whole ore body was.

That's right, to delineate the ore body, so that you could find out what was there, the grade and everything, and if it was economical or not. That's the whole thing.

How long did that process take you?

Oh, gosh, I was there, let's see, in 1962. God, there was quite a bit. We were still drilling even after the mill was starting to be built. So that would have been at least till 1965—two or three years that we just drilled. But, you see, we had a pretty good-size ore body mapped out before anybody ever knew it. Byron Hardie came there in the spring of 1963 or 1964. He was a geologist. He came in there, and I didn't know Byron. I'd never seen Byron before. I had all the cross sections at home, and all the assays and everything. We talked about the geology. We talked about all sorts of things, but I never told him anything. I didn't know him, and I had learned years before to keep my mouth shut when it comes to assays and stuff like that.

Even though he worked for Newmont?

Yes. Well, I didn't know him; he was new to me, see. Finally, Byron called Bob Fulton, and he told him, "Boy, this guy hasn't even told me the time of day!" [laughter]

Well, Bob got a big kick out of that, so he called me back, and he said, "Don't worry about Byron. I know Byron. I went to school

with Byron." He said, "You won't have to worry about him."

So, the next day I took all those sections down to the office. See, I was going to work at six o'clock every morning. I was down in the office, and Byron says to me, "Don't you ever sleep?"

I said, "Well, if you want to work here, you got to get up early."

He started coming in at six o'clock. That was before anybody was there. And there's no telephones or no nothing, and you can really get a lot of work done. So I spread these sections out and showed him. Oh, man, he couldn't believe it! He couldn't believe it.

"Wow!" he said. "You really do have something here."

So, anyhow, after that Byron and I could discuss anything. [laughter] Like I told him, "It isn't that I didn't trust you. I didn't know you."

I learned long time ago to keep my mouth shut, because I can remember when I first went to work in Goldfield, I was running the hoist, and some of the engineers had got ahold of some assays, and they yakked about those assays. The thing got around, and some people went out and located some of the claims, where they thought the company might go. I heard Fred Searls say, "Any man that gives out any information on the assay, fire him!" Just like that. He says, "He's no good to the company."

And I said, "I learned that a long time ago, and I keep my mouth shut. I don't talk about assays, see, or anything else that has to go with exploration." And maybe, that's one of the reasons why I got along so well with everybody, because I didn't. That was *so important*, because when you find that, you don't know what you have, and there might be a lot of ground out there that you should be picking up to protect yourself. So you don't say those things, because it's just self-preservation when you do that.

When you say you don't know what you have, during this whole delineation process, you mean you don't know how big this is going to be?

No, you don't know, and you don't know where it might lead you.

So, for two or three years, you don't know exactly the shape of this ore body.

That's right. And not only that, but if you can get a handle on the geology, that might be transferred somewhere else, where the circumstances may be the same. So you always try to corral everything, if you possibly can, get the claims on it, set your claims out and tie it up, so that if it's there, you can have it. And then you drill it, and if it's not there, forget it, see.

You had to keep this all quiet, and yet, it's so exciting.

I'm telling you, Naomi got on me. She said, "My God," she said, "you're going to be going to work at midnight!" Because every morning I'm going in a little bit earlier, a little bit earlier, and earlier, and earlier, because I couldn't wait to get to work. I could not wait to get to work. It was beyond any doubt the most exciting thing that ever happened to me.

And you couldn't even tell Naomi?

Oh, I don't know. I might have told her that, "Well, we got something up there, but I don't know what, so don't you say nothing to nobody." See, she wouldn't.

But you wouldn't tell her any details, just that this was exciting stuff, and she could tell, obviously, by your behavior.

[laughter] She sure could. Yes. That was fantastic. That was something that you just can't describe.

It has to be like a dream for someone in mining to find something like this.

Oh, yes. Oh, yes. But when you have it there, and nobody else knows it, it's like if you had a great big pile of gold, and you were sitting on it and trying to hide it from everybody else. [laughter] It was fantastic.

You must have walked around town thinking, "If people really knew what I have here."

No, I didn't. When I left there, it was just as normal as could be. I always got gas and stuff at one station, and the guy would always be talking to me. I never talked about what was going on at the mine. Never. Except, "Boy, that road is sure rough," or something like that. "It was muddy." But I'd never talk about anything of what we were doing. Nobody knew.

You'd be surprised when people would come to visit. "Gee, you guys must have something. How come all this activity?"

"Well," I said, "we got quite a bit of ground. We got to cover it. We got to know if there's anything here or not." And I says, "That's why. You generally get a piece of ground—raw piece of ground. You got to drill it, and you got to do it. You got to find out." And I says, "You have to hit it before winter time. And usually, summertime, you're going like crazy, see." I told them that.

So, people were digging, trying to get information from you?

Oh, yes. It was fantastic.

So, tell me now a little bit about the process, because you showed me some fabulous pictures from the time there were some cuts on the hill, all the way through to the development. Describe to me how this process went.

I'm not sure how much of that particular time John Livermore got involved in, because I know he wasn't there very long. He was sent to Canada as Vice President of Exploration for Newmont. He was gone before I got there, so I'm not sure how much he was involved in it, but I do know that Alan went there, and Mort White was the engineer, and he located most of the claims right there at that particular point. Alan had these bulldozer cuts put in to check the geology, because you can't see it. Everything is practically the same before it's disturbed. Well, when you cut down and get down to solid rock, you can tell what the formations are. By sampling that, making cut samples through that, you could assay that, and if there was any kind of showing, why, it was always an indication that there might be something more at depth. So all of that would be put on a map.

When you've got all those various cuts and things mapped, it starts showing you a picture of what might be there. Then, of course, they put in their lines of holes that are to be drilled, and it forms this grid of holes. Then you start drilling, and that starts giving you the pattern of the size and the shape of the ore body. You get it in all three dimensions. You get the size of the hole, the depth of the hole, with the intersection of ore, and you mark that off in your hole. You get this on the section, then you can just draw your lines and actually measure the tonnage that's in there.

So then, from the bulldozer cuts, what came next?

The drilling.

You were describing to me drill roads. Explain that.

Well, you put a road in, so you can get to these drill sites. The drill site would be where the intersection of these grids would be, where you put the hole. You have to have an area leveled off so you can set the drill up and do the drilling. If they were on a hillside, you'd put a road along the contour and try to get more than one hole. You couldn't put in a road for every hole, but you might put a road on a contour and get several holes out of this one road. This is the way we worked that.

Tell me about the drilling equipment.

Well, the geology there—a lot of it was a kind of a sandy silt, and it had chert seams through it. Now, that chert is extremely hard. We drilled ninety percent of the ore body with rotary drills. These would need the use of tri-cone bits. We drilled those holes four and three quarter inches in diameter. We would drill, as a rule, around three hundred feet, three hundred fifty feet, depending on the previous assays that guided you on how deep to go. We would sample every five feet, and that would be collected and then split down into assay-size packages. We always kept spare duplicates, so that we could go back and check them if we had to. Those would be stored, and the others would go to the assay office. And then, we did try other assay offices to check to make sure that we were getting the same. Harry did a fantastic job. We found that he was very, very accurate in his assaying.

One of your pictures showed one of the drill rigs and how you split up the assay samples. Would you go through from your

memory and describe that to me again? First of all, what was that drill rig? Was that owned by Newmont?

No, our drill rigs were rented from the people that owned them. Isbell Construction had the first one. They came in there, and they went to do the preliminary excavation for us. When we got Lou Eklund, he got a rig, and he came in there, and Lou did the biggest part of the drilling after Isbell. He had a truck-mounted rig where Isbell's was track mounted.

They furnish the operator and the helper, and we have a sampler. The sampler is our man. When he starts that hole, we put a piece of canvas around the drill rod. The cone that goes around it with the hose that goes to the bin that collects the sample—that's on a suction fan that draws those cuttings into the bin. Well, that hole sample is caught. What comes up and hits that little dome, the little bin on top, that drops down on the canvas, and the rest of it goes into the bin. Well, when you get five feet, the guy stops the rig. He pulls that little cover away from the canvas. He pulls that canvas off and dumps that into a tub, and goes over to the bin, empties the bin, and blows all that out good. After we get the sample out, we blow it all good as we can, clean it up. Then we close the bin. We put the tarp back down around the drill rod, and put the cone back over it, and he starts drilling. They take these cuttings from the tub and put them through a splitter. We split that down to where we want it, because the splitter is about two feet long, and this absolutely splits the sample in half each time. So we keep half, and we eliminate a half all the time until we get down to the size sample we want. Then, we'll take that sample and split it and keep a duplicate. We always have a duplicate, so if something happens to a sample, we can always have a sample to fill that gap, so we don't have a gap in the assay

of that particular five-foot section. And then, that goes to the assay office.

So that's done every five feet as you go down three hundred to three hundred fifty feet?

That's right.

And each one is assayed?

Each one, every one, right from the surface down.

And that's where you get your three-dimensional part of the mapping?

That's right. See, when you put that on section . . . say, you have a cross section that runs north and south, you have that section. You would see it from that angle. And then, when you put it longitudinally, you can see it from the other side, when you get a line of them. So you'll get the three-dimensional picture of the whole ore body. And then, with the assays you get a weighted average for that particular tonnage.

And that's where you can start to estimate the volume.

You estimate the volume and the value of each one of those. That guides you during your mining. You know that a certain area runs so much, so when you start mining, you want to blend the ore as much as possible to go through the mill at as even a grade as you can, because then you don't have those ups and downs in the mill where you might get losses from, maybe, a lack of cyanide or lack of lime or something in the mill that might cause you to have the tails run a little bit high in the sample.

Let's go back to that estimating the volume and the value. When did you feel like you

knew what you had, that you knew the whole outline of the ore body, and you knew, really, what you had?

You mean a time frame? I don't think we really knew until, probably, a year or so after the mill was built. See, because we were drilling all the time, and what we did, we delineated one area around, and then, one area was open. We kept drilling that until we came to the end. By that time, why, the mill was built, and that particular pit area was all delineated, and we could go ahead and mine. But we tried to get the main part of it done, so we could start stripping. And you had to do that, so you'd know where to put the boundaries of the pit, because the pit has to be on a certain slope to protect it from caving in after you get down to depth.

You had to have the whole thing delineated before you could start mining?

You have to have pretty much the whole thing. Like a horseshoe, you may have, oh, three sides done, and this side may still be open. But you could go ahead and start stripping the higher side, and then you could work down as you're doing that and then delineate it, because you have to know the extent of the width of it, so you could get the pit walls established.

Because you can't go straight down with pit walls.

No, you can't. Pit walls have to be on a slope, and that depends on the rock. How competent the rock is determines how steep you can make the walls, so they don't slide down. Some of the major pits have had some terrible cave-ins, where they have tens of thousands of tons of material slough in. I know there in Ely they even lost a shovel and other equipment that would get buried

from sides of a pit, because if you get a fault back there that might be a little bit wet and muddy, and you get all this weight, pretty soon that will let go, and it will slip down, and it'll take anything that's in the way.

So all of that is established in the delineation and the planning. That's why that part is so important.

That's right. You have to take into consideration the competency of the rock and any particular fault that might be known off to the side that may influence a slide as you get at depth. But we were very lucky. I don't think we had a slide at all in Carlin, that I know of. We took twenty-foot benches, because they seemed to be the most economical as far as the ore went.

Were you continuing to work year round?

Oh, yes. Yes, we never did stop.

Tell me a little bit about the conditions.

Well, boy, up there at that elevation in Elko—I think it was around 6,800 feet—we had a lot of snow, and it was very cold in that area. When that material got wet, we had mud—mud you can't believe. Of course, once we got the pit established, it wasn't so bad, because you were on solid ground then. But still, all in all, you always had mud; you couldn't get away from it, because when you drill even blast holes for your benches, you have to go below level sometimes a couple of feet so you can get a breakage. And that still was loose, and you can get mud. But it is nothing like the surface. We lost bulldozers in that surface mud. There just seems to be no bottom to it. But no, the conditions were tough, and all you did was doze them. We always had a dozer, and you'd doze an area, and you could go to work, see. It just

made it uncomfortable being out there. But you protected yourself. If you started a hole, you could put a canvas around the drill rig. We had frames we built, and we'd use a salamander. You could keep warm and still go ahead and work.

What's a salamander?

A salamander is a heater that you put diesel fuel in or fuel oil in, and it burns. It's got a round bottom tank that holds about ten gallons and then a pipe that goes up like a stove pipe goes up. The tank is probably eight or ten inches, or maybe a foot deep. All that does, it burns that diesel fuel and goes up that pipe and gives a lot of heat, but it also has a lot of smoke. We look like black men sometimes by the end of the shift, from the soot, but it was a whole lot better than being out in the wind. When that wind blows, boy, and it gets below zero, it can almost petrify you.

It was cold. But we drilled, though. You don't get quite as much done in the winter-

time as you do in the summertime, because everything is frozen up. The equipment doesn't start as easy, and you have frozen water, and you have things like that. The diesel oil—you have to make sure that it's treated so it doesn't freeze, because diesel oil will freeze. You have to add either number one oil or kerosene or something like that so it won't freeze at those colder temperatures. But we didn't have any problems. We had done that in the past, and it didn't bother us.

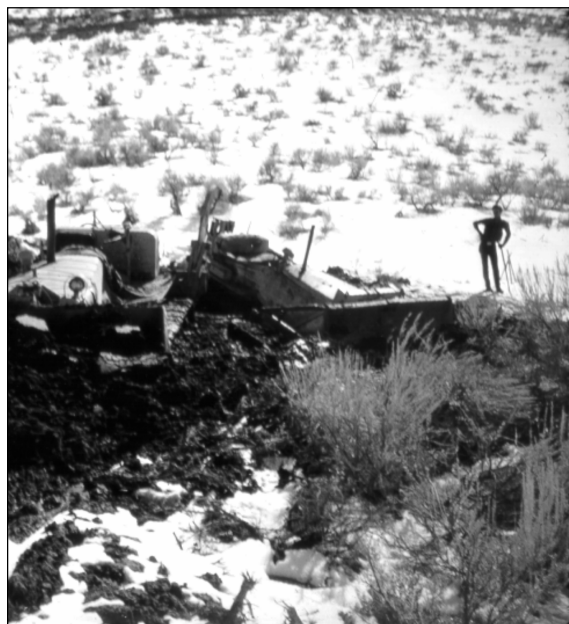
In that drilling process, did you run into any problems, any new situations that you hadn't dealt with before, because of the type of ground or the area?

You run into problems. We had rods break, or a bit might break off. You might lose a hole; you'd have to drill another one. If a drill rig breaks, then you have to go down, fish it out. But that's things that can happen, and they can happen any time when you're drilling.

You were telling me about a problem you ran into early with your water well.

Oh, yes. We drilled three wells on the south side of the ore body over the mountain, which we didn't have very much luck with. We found some water, but not very much. It wouldn't have been enough to run the mill, so we had to find another source. Byron Hardie and Bob Fulton came out, and the three of us went down, over on the other side, and Byron mapped those faults. He told us there's one fault, a north-south fault, that was going in a kind of east-west fault, and he told us, "Drill right here." And he pointed a good area. He said, "And I think that you'll find water." And boy, we did. We drilled down just about a hundred feet. I'm sure that was awful close, within a foot or two, anyhow.

We had water, lots of it. But we had a problem. The driller was losing his drill mud,



"When that material got wet, we had mud—mud you can't believe." Two mired D-8 cats, Carlin, 1964.

and he said this must be running water there, and he couldn't go any deeper. So he told me he was going to have to case the hole. Well, you see, the water was moving, and when he put his drill mud that would hold the cuttings together so he could get them out, it was washing them away, so that all he was getting out of the hole was clear water. So he wanted to case that off. Anyhow, at that particular time, I had to go start a drilling program in southern Idaho. I took a man up there, and I told him, "Go ahead and case the hole," and to go ahead with his drilling. It was going to be two or three days before I could get back. I thought it would be two days—I'd go up and come back. So I went up, took the man up to Idaho, and got him started. When I came back, as I was going up to the mine, I met the driller. These are sixteen-inch holes. It wasn't a rotary hole. I forget what they call it now. It goes up and down, anyhow—a churn drill. He told me, "Well, I got a problem."

And I said, "What's your problem?"

He says, "I dropped a casing down the hole." He said, "I got to go get some fishing tools to get it out." So he was going to make some phone calls. Well, he went down, got some fishing tools, and he went back out there. It took a day or two to get them. He went up and tried to fish that thing out, and he couldn't. He just couldn't. He messed around for a day or two. He says, "Well, there's only one thing left." He says, "I'll beat it out. I'll just take my bit and go down there, and I'll break it up and beat it out." Well, he did that, and he couldn't beat it. He found out that stuff was too hard. He couldn't beat it out.

So, we'd lost about a week or ten days on that hole, and that was starting to cost a lot of money. So I told him, "Forget it." So we offset a little bit and drilled another hole. We got down about the same depth and ran into the same situation. So, I told him, "You can go ahead and case it, but don't you drop a casing down, because if you do, it's going

to be at your own expense." So anyhow, he cased it down, and there was so much water that he was having trouble. So I told him, "Well, stop it. Stop it." I put him on another location to drill another hole, down the valley about, oh, half a mile or so from where this hole was.

While he was drilling that, we put a pump up there and started to test that well. Man, I'm telling you, you talk about water. I don't think there was over ten feet of water in that hole. And the draw down, after pumping 500 gallon a minute, was only something like two feet, which was absolutely fantastic. We pumped there twenty-four hours a day for I don't know how many days, and that water never went down. So we figured, "Well, we got a well." Well, we hit water at the other well, also, and we cased it and then just capped it and left it. Then, when they started to build the mill and needed the water, they put in a pipeline and pumped that water. The well was about 1000 feet below the mill level, so they had to put a pretty good pump up there to get it at that elevation. But all the time I was there, until the first of the year of 1972, they were still using that same well and same water without a bit of problems. Never had to use the bottom well all the time I was there. That turned out to be a fantastic well. Old Byron deserves a lot of credit for that. He really picked the spot. He knew exactly where they were, and so he did a fantastic job on that.

So, mud and cold and that sort of thing, and the drilling and the delineation process—those were pretty much the only problems you ran into at that point?

Oh, we had that fire that went through there that took 550,000 acres of area in northeast Nevada. Man! Well, lightning started it, and it burned, and it came pretty close to the mine there a couple of times, and then the wind would shift. We were pumping this well at the time. I had a man

watching the pump, and I also had some diamond drillers on top of the mountain opposite the mill, which wasn't in the mine area, but they were doing some drilling to test some rock up there. We also had all our crews in the pit. Well, we had the pit equipment pretty well secured. Most of it was drilling at the time. But the wind shifted, and I thought, "Well, maybe I better go get that man off of that well." I was worried that he might get caught, because that stuff burns like wildfire. It was about a mile by road to the well. I started to go down there, and the fire had crossed the road in one place. I couldn't get through. But this hillside off to my right, which would have been the east side, was already burned. Well, I had a four-wheel-drive pickup, so I ran out and put the hubs in and put it in four-wheel drive, and I went up that hill, because I knew I was going to meet that fire if I kept going. So I got up on that hillside, and a lot of it was still smoldering. But I went down, and I thought, "My God, that fire has already gone past the well." I thought, "Well, I hope that guy has sense enough if the fire comes, to jump in the tank, that he stays away from it."

There was a lot of cheat grass. I don't know what cheat grass is, but that thing burns like gasoline. Going down that hillside, down that canyon, there was sagebrush that must have been eight, ten feet high. That stuff burned just like tires—big, black smoke going. Well, anyhow, BLM had commandeered our bulldozer, and they brought it back a few days before this fire hit us. And they broke an axle going up this hill before they got to the mine. They had to dump the cat there, and they made a couple of passes around the truck and brought the bulldozer up to the mine. We got them a ride to town. But I was wondering, well, the truck already had that thing off, so it would probably be all right. So, I went down to the well, and that guy was scared to death. He says, "Boy, it came right here close." But he said, "I was

going to get in the tank, had it threatened me." So he had thought about it.

So I got him. I got on the radio, and I got ahold of the mill superintendent and told him, "Go up on that hill and get those guys off of that hill, because that cheat grass is going to go like wildfire." Well, he went up there to get them, and the fire had crossed the road where he was, and he couldn't get back. But they had the water truck up there where they were diamond drilling, and they used the pump there. They wet everything all around them. That fire went all around them, and nobody was hurt. But it scared the pants off of them. Anyhow, nobody got hurt, and the fire went through. But it set that BLM truck on fire, and the cab of that diesel truck . . . of course, the tanks blew up and, oh, man! That aluminum ran down the road just like melted solder. The doggonedest thing you ever saw. But it was a total wreck. The tractor was completely gone. It was a total wreck. The tires burned off of the trailer and that. I don't know how much of that they salvaged, but that was a pretty costly operation for the BLM. The fire



"I got on the radio, and I got ahold of the mill superintendent and told him, 'Go up on that hill and get those guys off of that hill'."

was so hot, because that sagebrush was so tall, and I guess the tires caught fire, or the tanks blew up, and away she went. But once that went through, then there was no more. When that fire went through there, it looked like you'd dropped the atom bomb. *Everything* was black.

Well, it was the day after the fire; I was going down to check the well, and a poor old coyote who'd gone through the fire, somehow, was so lame he couldn't hardly walk. You could see burn spots or black spots on him, and it was pathetic. I had a .22 rifle with me, and I had to shoot him. I shot him for just to put him out of his misery, you know. At that time you never saw a bird; you never saw an animal or a rabbit or nothing. But shortly after the fire, boy, did the chukars come in there. Oh, man. Oh man! Did they come in! You see, the sagebrush was all burned, and they would scratch where that sagebrush was, and it was full of seeds. They were in there thicker than flies. Man, I'll tell you, those boys of mine and I had a field day out there with chukars after that. Oh, man!

So now, this fire started by lightning?

By lightning, yes.

And it started where—anywhere near where you were working?

Oh, gosh, it was several miles from where we were, but it just went like crazy. And BLM fought it, you know, but then it would jump, and then they had more lightning, and it set other fires. Boy, I'll tell you, that was one of the worst I ever saw. If I'm not mistaken, it took 550,000 acres.

That's an incredible amount of land, yes.

Yes. Oh, gosh, almost all of northern Eureka and Elko counties.

And did it get anywhere near the mill?

No, the mill at that time wasn't being built. We weren't to that point yet. We had all the drill equipment in there. But then, we had enough roads there. We had a bulldozer, and we made sure that we protected everything, so it didn't bother us; it didn't hurt us. It just went around some of the places where we were working. Thank God, nobody got hurt. But that was a real bad one, because I'll tell you, if you ever saw an area that was absolutely barren of any kind of life, well, that was it. Terrible.

And before that, it was such a beautiful area.

Oh, yes. There were always jackrabbits out there, and there were birds, and there were coyotes. There were deer in there and everything. But after that there was *nothing*. Absolutely nothing. Weird. It was really weird.



We've talked about the drilling, but could you give me some specifics on the calculation of the ore body, once you had it mapped out?

Well, as we drilled it, then got the ore body pretty well delineated by drilling, there was a geologist, a Canadian by the name of Bob Sheldon. He was not only a geologist, but also a geological engineer. He worked for Newmont for quite some time. And Bob was called in, and he took all the cross sections and longitudinal sections, and he drew up the ore body and calculated everything as far as the tonnage and the grade and so forth, and came up with the total tons. I believe it was something like 11,000,000 tons of ore that averaged something like about .32 ounces per ton.

When this happened, did you have any sense beforehand of what it was going to come out?

Not in any exact amounts. I had a pretty good idea that it was going to be there for several years, I guess, from that. But how long it would last would be how big a mill you had and how much tonnage you put through the mill each day. I had an idea that it was a pretty good-size ore body, but actual tons, no, I didn't know.

At what point did all this information start to get public? You talked about how it was secret for so long.

[laughter] I think it turned public about 1964, because what happened is that an American mining company went up to Canada, and they found a big gold mine. They got in trouble, because, before they announced it to the public, I think some of the officials of the mine bought up a bunch of stock and got in trouble. Old Plato Malozemoff, who was the CEO of Newmont—I think that scared him, and he went public with it before anyone would have a chance to capitalize on anything like that.

He wanted to avoid any insider trading knowledge type of thing?

Right. So anyhow, he went public with it. Once it was made public, why then, boy, it was a hornets' nest around there. Everybody was interested then and coming around. We had all sorts of people coming in wanting to see what the ore looked like and how we found it and all that sort of stuff.

So once it became public, then that became part of your job—dealing with the public coming in all the time?

Well, no. They would come in there, but then we tried to discourage as much as pos-

sible, because we had lots to do, and we sure as heck didn't have time to show them around. Besides, we didn't really know if we had everything we wanted. So we didn't encourage anything.

So you weren't encouraging public tours at that point, for example.

No. Absolutely not.

When the total calculations were finally made, was that announced, also?

Well, I'm pretty sure it was announced. I'm not sure just how, but it was announced that we had an ore body, and we were going to build a mill. I don't really recall if they put out any tonnage or grade or anything about that, but I think they just announced that we'd found an ore body, and it was good enough to build a mill. And we went from there.

The decision about the mill came after this was all calculated?

Oh, yes, I'm sure of it. See, we had to know what was there before and what size mill to build and so forth. And another thing, we had all these samples gotten from underground and from the drill cuttings, because we didn't only have the adits to get large bulk samples. We got a lot of bulk samples from large drill holes—twelve-inch drill holes—we had drilled in key areas to make sure that we had a good representation of the ore. That was done in Salt Lake—running all these tests on the ore to see, and also in Danbury, Connecticut, in our labs there. We had a big laboratory there, and they all worked on this to come up with a flow sheet.

So, although the exact amount might not have been published back in that day, you knew that you had enough for building the mill. You weren't involved in building the

mill or any of the mill site. Did you have any coordination with them?

Oh, yes. You know, I was at the mine, and I was in charge of the area. Almost anything that went on, that they had to do outside of the actual mill building, why, they'd come to me—like roads and all that sort of stuff—but as far as supervision of the mill, building of the mill, no. I did supervise the building of the pad, shaving the top of that mountain off and getting a big enough area for the mill; from there on, contractors took over.

Tell me what was happening, then, back on the mining side as the mill was being completed. Where were you?

Well, we were getting the mine prepared for mining. We had to strip the overburden off, and we had contractors in there. We had Isbell Construction, initially, that did a lot of work with their scrapers and shovels. Then, we had another contractor.

Let me interrupt you for just a minute. When you say stripping the overburden, you're talking about the waste at this point?

Yes, overburden and waste—they're synonymous. So, we were stripping that and uncovering the ore and getting it ready, exposing enough of it so we could go ahead and mine. We were having some problems, because that spring it was so wet that some of the areas we could not open up until the ground had sufficiently dried so we could get equipment on it. You couldn't hardly even build a road out there, because it was so muddy, but once we did, why, we had it opened up, so that when the mill started up we'd have ore to put through it. Now, in the one area that we worked on, there was quite a bit of silicified chert in the ore, which made grinding in the mill a problem. And that hurt for a while, until I could get enough softer,

better ore opened up. The reason we didn't get it opened up is because of this mud situation. We couldn't get to it. But once we did, why, that was overcome.

This goes back to one of the things you mentioned earlier, which is mixing the ores. Could you talk a little bit more in detail about that? In other words, you don't send high grade straight through the mill.

No. We tried to blend the ore as much as possible to keep the heads about the same as what the ore body would run—in other words, an average as close as possible to what it would run, an average of .32 per ton.

I think that first year, we were almost right on it, because we had enough opened up and could blend from almost anywhere we wanted to. Of course, as you mined, sometimes some good ore would be more scarce than the lower grade, and you couldn't bring it up to where you wanted. But most of the time we did all right. That was the whole thinking behind the blending, so that you could keep the low grade going, so you could get it all in. Because if you took in all the high grade, then you'd end up with low grade ore that may not be good enough to pay all the bills or keep it economical.

You mentioned something about the different colored ribbons on the stakes.

Oh, yes. Well, anytime that we drilled blast holes, those blast holes would be assayed. Once we got the assays, we'd have the engineers go back and re-establish where those drill holes were, and we would put a lath there with colored ribbons: red for ore and blue for waste. Usually, when we shot we didn't disturb the ground that much. The shovel could go in there pretty much and dig out the ore and separate it from the waste and so forth, and it worked out very well. In fact, I think they're still doing that today.

That was one of your ideas?

That was one of my innovations, yes.

Were any other problems that you ran into?

Yes, oh, yes. We ran into carbonaceous ore, which wasn't amenable to cyanide, because that carbon would precipitate the gold when it goes in the solution. They'd go off in tails. So that had to be treated separately, and we didn't mix that. That was always kept separate until they came up with a system of either roasting it or using chlorine to oxidize the ore. But I think that they were having problems at that time getting enough chlorine to do that. I think then they went to roasting. What they had to do was oxidize the ore before they could use it with cyanide.

So when you were running into this at the beginning, they didn't have a solution at that point?

No. At that point, no.

So, what did you do with this ore when you came across it?

Well, we went around it and left it, and if it was in the way we would stockpile it, so that it could be fed when they did have a facility ready for them.

So, when you run into something like that, it puts the labs into motion trying to find solutions to that?

Well, yes, there was enough of it. There was enough of it, and the grade was sufficiently good enough, that they had to come up with a solution for it or lose it, and so they did. They had enough brains in the Danbury lab with their chemists and metallurgists and that, that it didn't take them very long. They came up with a system to build

another addition to the mill to treat that particular ore.

Was it a surprise to find that carbonaceous ore?

No, we knew it when we drilled. We knew that we were going to run into it, but we didn't really know how big, or how much it was. We knew that it was in those drill holes, but we didn't know how prevalent it was in those areas. These just happened in spots, but then the tonnage was quite large—the carbonaceous ore.

So that made it worth finding a solution and retrieving the gold out of it?

Oh, yes. You bet.

Anything other problems that you started running across there?

No. It actually ran pretty doggone smooth. Once they got those things fixed it ran very well. I don't recall any problems that we had, not while I was there, anyhow.

You mentioned a couple of things as we were looking at slides, that were new solutions, new things that you were trying at this mine. Some of the equipment was different than had been used before?

Well, we kind of pioneered in the mining, loading with a front-end loader. They didn't use front-end loaders very much in the mining. I think they used some at the Getchell. That was before we got there at Carlin. But I don't know of any other place then. They could have been, but I think that our using it brought it out in the public a whole lot more, because we had an awful lot of visitors from interested mining companies to see how we were actually operating. Using the front-end loaders worked out very well. Of course, you have to blast a little bit

harder for a front-end loader, because the buckets are so big that they don't dig into tight ground as a shovel will. See, a shovel will do a whole lot better job.

There was a scraper and then another vehicle there. Would you describe what was being used?

Well, there were some areas that weren't all that hard, so they used scrapers, because the scrapers could move the material so much faster and cheaper than loading with individual trucks. So a lot of that was taken out by Isbell Construction with their scrapers. Howard and Crawford.

The scraper has like a tractor in front of it, two wheels. And then they had everything hydraulic. They had this big can behind them that they pull, and they can drop that down, and it scoops up the load. A lot of times the dozer will push, help them to load,

and then he takes off. Soon as he's loaded he takes off, and then he'll dump it all by himself. Then he comes back for another load. Well, usually the dozers with rippers will try to rip material ahead, so that they can load fairly easily.

So it's the scraper that actually scoops it up and hauls it, and it was the dozer that was loosening the ground.

He does the ripping and loosening it up for him. And he'll also push to help load those scrapers, because sometimes it takes a little bit more push than those two big wheels in front will pull.

So that would be used where possible, but then what was the difference in deciding to use the front-end loaders or the shovels? That was harder ground that you were working on?



A Howard and Crawford contractor stripping to ore, 1964.

Yes. That was ground you had to blast. See, you had to drill and shoot. So then, the shovels would work that. The shovel is a whole lot more expensive piece of equipment than a front-end loader, and there's a lot more maintenance to a shovel than to a loader, but a shovel will dig a whole lot easier and better into harder material than a front-end loader will.

But where you could use a front-end loader, that would have been a cost savings for you?

Yes, it's a savings. Of course, later on they come out with these hydraulic shovels that were almost like a loader, but they had a whole lot more power to dig than the front-end loader. We didn't have that at Carlin at that time, but they did get them later on, with a whole lot bigger buckets, and, of course, bigger trucks than what we had. But they weren't available back then.

Talk about the size of your trucks, too, because that changed.

Yes. That changed. See, the contractors had the smaller Euclids that I think went up to twenty, twenty-five tons is all. When we got our equipment we had thirty and thirty-five-ton trucks for a while. Then we got a bigger shovel, and that was a P & H diesel electric shovel—a six-yard shovel. Then we got sixty-five-ton trucks. These were the Dart trucks, and they worked out very well.

So, Newmont started out with thirty-five-ton trucks and then moved up to sixty-five-ton trucks.

Yes, we had thirty and thirty-fives. We had both.

When Newmont first started getting their own equipment there at the mine, about

how many of these pieces of equipment did you purchase?

Well, we had three shovels, and I think we had a 988 loader. We had twelve trucks—thirty and thirty-five-ton Haulpaks. The third shovel purchased was a five-yard with three sixty-five-ton trucks—the Darts.

With that equipment you could keep up with the mill?

Yes. We were able to keep up. We didn't have that much stripping to do. The only other stripping, or moving of waste, was waste in between the ore body, where you can't take it all at once. So, usually one shovel was always working waste, or maybe two shovels in waste and one in ore. We were always supplying the mill with something in the neighborhood of 2,000 tons of ore a day. That whole ratio of the mine was three to one—three of waste to one of ore.

One other thing that we did at Carlin that was fairly new at the time was our assaying. They got Atomic Absorption spectrophotometer to do the assaying, and that was a whole lot faster than the fire assaying. You know what they did, they just built a curve of known values and built a curve for the AA machine, and then it was just a comparison. Gee whiz, it worked out very well. They got our samples out a whole lot faster than we'd ever got them from fire assaying.

You could do it right there on the property?

They did it right there, yes. See, old Harry Treweek was doing our assaying before we actually found the ore body. When we started in operation, we hired him as our regular assayer, so he did the assaying. Of course, Harry was exceptionally good.

And he was using the fire assay. Is that right?

He did that at his place. We had the same thing there, too. We could always back up the AA with fire, see. But most of it was done on AA.

And that was new technology at that point?

That was new. That was fairly new, yes. That's the first I'd ever even heard about it, was right there. But they did very well. It kind of matches the mill, because they do it with cyanide and melting out the gold and then titrating it. It measures the amount of gold in the solution.

The point was to get your assays faster?

Faster, right. There's an awful lot of assays. Any time you're drilling all those blast holes, you have to know what they are, so that you can dig them. You want to know what they are before you shoot. Mark them, and then the shovels can go in there and dig them out.

You don't want to blow up something if it's not going to pay off, right?

Well, you got to shoot it, anyhow. If it's waste, you got to shoot, but you want to know, so you can separate the ore from the waste.

And you did that at the blasting?

Well, you do that after you blast. You can delineate it and mark the holes: that's waste, and that's ore. Because you don't spit it all out when you shoot the material and mix it. It just shakes it up and down, and then they can dig it out. It almost stays in place. So it worked out very well.

You told me an interesting story about one time when you did more blasting than other people thought, maybe, was going to be safe.

Oh, yes, that one big blast. That was right after we had gotten the big shovel and the big trucks. We had sixty feet—three benches—of waste that had to be moved, so I decided to drill all three benches at once. We drilled those with six-and-three-quarter-inch holes. I forget how many holes we had now, but I know we shot eighty tons of explosives for that one shot. [laughter] Jay McBeth was the general manager of the mine. When I told him I was going to shoot that much, why, he almost had a heart attack. He was afraid that we might blow the mill off of the mountain. I wanted him to watch the shot, and he didn't have nerve enough. He took off for town, and he said, "Just let me know if the mill is still sitting on the hill when you're through." [laughter]

So, he trusted you, but he didn't want to watch it?

Yes, he didn't want to watch it. But we timed it. It was all timed. And when they went off, it just kind of went "brrrrrrt." That's all. It was all over within a few seconds, and we didn't disturb anything, didn't hurt nothing. And that big shovel was over there for about three months off of that shot. [laughter] That's the biggest one I'd ever done. And that's the biggest one that was done at Carlin at that time—although we had some good ones. We had a lot of them that came close to that.

Without the larger trucks and shovels, the Haulpaks and so on, there wouldn't have been a point in trying to do such a big blast, would there?

Well, I don't know that it would be that much difference. It was just a block of waste that had to be moved. And that was just, I thought, a good way of doing it without messing around, because then we could use our

drills other places to do other drilling. And that shovel would be tied up there for a long time. We knew that. It worked out very well, very well.

One of the other things that you brought up was the cost of operations. As you said, by blasting all at once, you could then use your equipment elsewhere, and that was a savings in the long run. Is that right?

Well, yes. You could drill out a whole lot more and have enough ore exposed to blend better and have more of a difference in assay. In other words, you had better grade. You could pick and choose and blend better as you had more opened. So the more ore you had opened up and exposed, the better you could blend. So you could feed the mill a steady stream of just about the same size, same assay, or same value of ore.

And part of the thing, I think, that we're assuming but not saying, is that this assay was so important because you couldn't see this gold.

Oh, absolutely. You couldn't tell by looking at it, because the waste looked just exactly like the ore. So you had to assay every bit of it. You didn't depend on any sight or what you thought was there. You had to assay it.

Yes, and that assay totally directed your operations.

Right, right. That's why we used all those flags, you know, so that the operator—all he had to do was look at the bank, and he knew whether he was moving waste or ore. You can't tell it, not by sight. Assay was the only way.

Tell me a little bit about cost of operations. You showed me some spreadsheets this morning that were pretty interesting.

Oh, well. Yes, we really had an excellent operation. We didn't have a whole lot of people that we didn't need. The whole mine was run by myself and two foremen, one on days and one on nights, and then the mine crews for the truck drivers and shovel operators and bulldozer operators and ones that you need like that. We had excellent costs. I mined there for several years for about, oh, between thirty and thirty-five cents a ton, which was fantastic. It was almost unheard of at that time in the smaller pits. But if we'd have had bigger equipment, we could have probably even beat that, but that was very good.

Tell me, that was unusual for the company, is that right?

Well, it was. Old Plato didn't hardly believe it. He sent old Frank McQuiston over there to make sure that we were adding our figures correctly. When he sat across from me, why, I asked him why he was questioning me about the costs. I didn't make the sheets out. The chief accountant made the sheets out. Well, he wanted to know, "Well, Plato didn't exactly believe those costs, and he just wanted to make sure that we were reporting everything."

"Well," I said, "you know, the bills go in, and they have to charge them somewhere, and I know doggone well they're not charging mine to somebody else, because they'd be screaming their heads off." So I showed him all the various things. All of our mining costs were broken down. We had the drilling, haulage, loading, you know, by the shovels, the loaders, the whole works. It was all broken down. Of course, those were the direct costs, and then there was your overhead and indirect costs. It was all listed there. I went over all that with Frank, and then he was finally satisfied that that was it, but he was real happy that we could do it that cheaply. We produced the gold under

\$20.00 an ounce. This was probably about 1966, something like that, 1967.

Fairly early in the operation?

Right. Right, but you see, now things have changed over the years. We were using, almost exclusively, ammonium nitrate, which was a cheap way of blasting. We'd buy that by the carload, and they brought it in bulk. We had a tank set up where they unloaded in a tank, and then we had a powder truck that metered all that and everything, mixed it with the oil, all automatically, as we put it in the hole. We used Prima-cord and, oh, a little block of high-explosive to initiate the blast. It was very reasonable. Prima-cord—you tie all these in and tie them in between, see. You could shoot rows or individually or whatever you want, and they worked out very well.

So, because you were doing it in such bulk, you could get a savings there?

Oh, yes, and ammonium nitrate was so much cheaper than your other powder, because, you see, that's a fertilizer. All we were doing was making an explosive by mixing diesel oil with it. It won't shoot unless you have an initiator, because you can't blast that ammonium nitrate just by itself.

So that was one of the savings. What else was a savings, would you say, in there?

Well, of course, we had new equipment, which is always a big plus; you aren't always repairing broken-down equipment. We had good maintenance people that kept up the machines, like building up on the teeth of the shovels and that sort of stuff, and the regular, oh, weekly maintenance on the equipment, like greasing and all that. That was always done, and we always made sure that any vehicle that needed something, it

went in there before it got serious. So we stayed on top of all that. And then we had some good people there, so that always helps.

Was this different, when you say you had good people? I know, when you were doing all those small operations, you didn't have a chance to get a crew settled in and experienced. Was this different for you—to get people to stay?

Oh, yes. You get people to stay, and they were living there, see, and that makes the difference. We had buses that the guys would ride to work, and they lived in Elko or Carlin, and it made all the difference in the world. Those outside operations were always short-lived operations, and you just couldn't get good, dependable people. But you did on these steady jobs, because they knew doggone well that they were there as long as the operation was there, if they wanted to stay and take care of their work. So that made a big difference.

So, you could really put together a good crew.

Oh, we did. I think we had one of the best crews at Carlin that I ever had anywhere. We got along so well, you know. Everybody had a good time. We had a pet coyote there, who we called Freddy the Freeloader, and that coyote came and bummed from the truck drivers and those equipment operators at night. Then, he got pretty brave, because we'd heard about it. The coyote come in the night, you know, and he'd stand there and watch those guys eat lunch. Of course, they would start feeding him, and he got bold and came there in the daytime. I think if anybody had hurt that coyote, he'd have gotten killed. That's all there was to it, because everybody was absolutely tickled to death to have him come around. And you could see him coming; he knew when lunch-time was.

"Here comes old Freddy," and everybody saved him something. Oh, yes, he was something else. He was really something. Oh, I got the biggest kick out of him trying to catch a chukar. Some of these big boulders roll down the dump. Well, those chukars can climb on anything, and they can run fast. This guy chased that chukar around, and he just got up on top of this rock, and the coyote tried to get him, and he'd just go from around that rock. Finally, he just gave up; he just went and laid down in the shade of one of the rocks. That chukar got up there where he could see him, and he was just a chirping like he never had a care. It was as if he was tantalizing him. Oh, it was great. I wished I'd had a camera and recorded all that. That was fantastic.

But poor old Freddy—he got so fat that he could hardly waddle around. But he had a mate, and he brought her one day, and she stood way back. He'd come around, and when he'd get something he'd take it to her. At Christmas time, I can remember, after the wife had the turkey and everything, I got all that skin and fat, and then off of the ham and all that. I had a whole, big one of these grocery bags full of junk. So, I doubled or tripled the bag, so it wouldn't break, and I took it down there. I got in a big truck, because when you got in a pick-up, he wouldn't come so close. He was still a little bit spooky of a pick-up, but the big truck—he'd come right next to it. So I got in the big truck and went and drove down, and here comes old Freddy. I just opened the door. I didn't want to break this bag, and I just set that bag down and got back up in the truck and closed the door. He went over there, and he grabbed that bag, and he took off kind of running, but he didn't go very far. He turned around and looked at me as if to say, "Thanks," you know, and away he went with that bag. And it was great. It was great. "Merry Christmas to you." But it was kind of an oddity, you know, to have something like that happen in the pit. But have a pet

coyote. Heck, when we were on the dairy, I trapped them and shot them every time we saw them. But that coyote—I think I would have defended him with anything. He was just a nice thing to have around.

It's kind of an example of how tight-knit your group must have gotten, too. I mean families take in pets. So, here's this group of people out here that really adopted this pet.

Oh, yes. If a new guy came on, he was told by the crew, "Hey, we got a pet coyote. Now don't you harm him. And you bring him something to eat." [laughter]

That was part of the deal.

Yes. That was part of it. And I don't know, he disappeared one time. I don't know what happened to him, if he died or somebody killed him or what. But he was there for about, oh, a year and a half, two years. So everybody was looking for him, but I don't know what happened. He just disappeared all at once.

Did you make friends that have lasted, on that job, people that you still keep in touch with?

Oh gosh, yes. Yes, you bet. There's a couple of them I still keep in touch with. That was a close-knit group. It was dandy there. We had some of the best guys I ever had working for me. The whole operation was that way—the staff and all. You'd be surprised. Everybody got along real well. And everybody did a good job. I thought that was one of the best operations I've ever been around.

What do you think created it to be that way?

It might have been because we started from scratch. We started from scratch, and

everybody got to know everybody. Every year the company had a picnic where everybody got together and could visit—the families and everything else. That always helps. I think the working conditions were absolutely excellent. And I think, as far as the pay and everything, we were on a par with anybody in the area. Everybody had good equipment, and everybody was happy. Everybody was happy in their jobs. We had the buses that took them back and forth, and so they were just happy in their jobs. What makes a good job is that everybody is satisfied.

Do you think that any part of it had to do with being proud to be doing something that was so different in the mining industry—this invisible gold?

Possible. We had people that were our truck drivers that were over-the-road drivers that were tired of that. But yet, it was still truck driving. It was their trade. So we had some of those people, and I don't know, they just seemed to get along real well. I don't know what it is now. They got so many now, I don't know if they even know who their boss is, but it's a lot different. But then, it wasn't. We had, I think, a total of 135 people working at the mine and the mill, and everybody knew everybody. We got to know each other.

When you get to start something from scratch, does it feel more like your own?

Yes. You can kind of manage it. You know what I mean? They take good care of it, see, and it always looks like new, because most of those guys would be cleaning their trucks and everything else. Even when parked to eat, they'd all park side by side, just like it was a show piece. It just seemed to be natural. I didn't tell them to do it. They just did it on their own. It was just one of those things that they enjoyed doing.

Sort of a sense of pride?

Yes, sense of pride. They'd all get a chance to visit while they were eating lunch and that. It was just one real good job, real good operation. I thought that was one of the best that I was ever on.

We talked a little bit about the environmental things that came up. Newmont did some things on this location that hadn't been done before?

Well, when we built the tailings dam, of course, we built that with a great deal of care. We put that material on in lifts of anywhere from six inches to a foot. That was all compacted real good, and every lift was tested for compactions. Then, when the dam got up to the height that they wanted to go, they went below the dam. They drilled several piezometer wells, which were cased, and they could draw water from those every month and have that water tested to see if there was any kind of a seepage or anything going through the dam and could get in the way. I don't think that they were required to do that—not to my knowledge—but they did it anyhow.

Was that something new—a tailings dam?

Tailing dams are necessary at all mills. They impound the material that remains after the gold or other metals are removed. I don't know, to be honest with you, whether the piezometer wells were something that had to be done or not. They just did it, and all I know is that I had never seen it before, and I'd worked at two or three mill sites, and they never had them. But they did there. So they were taking special care, and they were taking special care, also, of any spills. Anything that spilled at the mill had to go to the tailing pond; it couldn't get away. Just the way it was located, anywhere it went, it would go down to the tailings pond.

On the mining side, did you have any environmental regulations that were over your work? Were you starting to see that yet?

I don't think so. I don't recall.

You didn't have to go through months of red tape before you could start operations?

No, no, no. I don't recall any of that. However, Newmont has always been good, as far as taking care of the environment, at least on any operation that I've been on. We never disturbed anything or did anything to harm the environment. Because most of the guys in the mining business are hunters and fishermen, and they're not going to do anything to hurt the environment. Heck, we had chukars right in the mine. They'd come in there and drink out of puddles in the mine. Nobody bothered them.

When do you first remember starting to deal with environmental regulations?

When I got up to the Idarado.

So, it was after Carlin and after the early 1970s?

Yes, and I think that was mainly because of the change in makeup of Telluride. See, they were getting a ski area in there, and Telluride and Ouray were all mining towns where people were used to mining, where you get these outsiders that didn't know what mining is, and just because they see you digging a hole in the side of the mountain, they think that you're tearing the world up. So there was a lot of environmental stuff at Telluride. My gosh, I spent as much time working with that as I did running the mine.

But in Nevada out where you were working, nobody was in conflict over use of that land?

No, not that I know of. All we did was watch out and make sure that nothing got spilled, because there was a ranch there that had a bunch of livestock. We didn't want to let cyanide get down there and kill a bunch of livestock. I think they did everything they possibly could. And, in fact, they did anywhere I was ever at. They didn't do anything to hurt the environment that I know of. I know that I had to fight them at the Idarado, but then, of course, we were dealing with an altogether different kind of people.

What caused you to leave in 1972? You loved this job. What came along?

Oh, yes. Well, in October, 1971, I had a call from New York. They wanted me to come up here to the Idarado and see if I could boost production of the ore to the mill, because they weren't able to produce enough ore to keep the mill running at full capacity. So I came up here on single status, stayed in Ouray, and worked with the miners and tried to get a little bit more efficiency, as far as the miners go, and get them to produce a little bit more. This was done by getting some newer machines for them to drill with and maybe some bigger hoses so they would be able to drill more holes faster and so forth. We boosted the production. I think they were making something in the neighborhood of twenty thousand, twenty-two thousand tons a month, and we boosted that up to about forty-two thousand tons by the time I left. I was only there six months. After six months I left there and went almost directly to Alaska to get the job started on the glacier. Then I left that and went back to Carlin. I was there until, oh, November or December of 1971, or was it 1972? No, I guess it must have been 1970 when I was up here. In 1971 they asked me if I'd take the job of manager of the Idarado Mine and come up here permanently. That was a promotion from mine superintendent to manager, so I took it, and

I came up here then. I'll tell you, it was tough leaving Carlin. I felt a great deal of attachment to it, being there right from the very start and seeing it grow like it did. Of course, I visited there two or three times afterwards on account of I just had to see what was going on. [laughter]

Yes. Do you still go back occasionally?

Well, occasionally, yes. I still go back.

Yes. Has it changed a lot?

Oh, yes, it has. They five mills going over there now in different places, and they have something like 2,500 to 3,000 people working there now, compared to 135 when I was there. But then gold was only \$35 an ounce. And now, at \$300 an ounce, it's quite a difference. They can afford, now, to mine at a low grade that you couldn't touch at \$35.

So they can do some things that you couldn't even do back then.

Oh, yes. Even while I was there, we did start leaching some of the ore that was low grade. We had a small leach pile going, and we made quite a few ounces out of it. But later on, as the price of gold went up, then they went to some enormous leach pads. They had thousands and thousands of tons of ore that they leached and were able to recover an awful lot of gold that they never could have otherwise.

So, they could go even lower than that .32 per ounce.

Oh, yes. I think anything that went at least .03, why, they'd leach and get something out of it. But when we were mining, .05 or .06 is about as low as you could ever go. You didn't want a whole lot of that, because it was practically nothing. It isn't even

going to pay its milling or mining. So you just couldn't mine that.

Plus, the equipment is very different. I mean, you were talking about your largest truck being a 65-ton, and now they have what?

Two-hundred-tonners, you know. It makes a big difference. And the twenty-yard shovels, so it makes a big difference, yes. Of course, they've got bigger mills and stuff like that. I just can't see two or three thousand people working. That's a whole bloody city. [laughter] That's a lot of people to manage. But, boy, I was real happy there with 135, because you knew everybody. You knew everybody on the job. And they stayed. You'd be surprised. We didn't get that much turn over.

Yes, and you were working three shifts. Were you working around the clock?

The mine wasn't. The mine was working two shifts, but the mill was running around the clock. A mill, you don't hardly shut it down, but they do the mine. The mine—we just work two eight-hour shifts, and we were able to keep up with everything. It was a fantastic job, believe me.

We want to talk a little bit about the exploration phase of the Carlin Trend. You talked about first going out there with Alan Coope doing some exploration.

That's true. That was the winter of 1961-1962. We walked all over northeastern Nevada.

How did you get there? Did you camp out, or did you go out on day trips? Describe a little bit to me what that was like.

We would stay in a motel, in Valmy. We generally stayed in Valmy, and we worked out of there and spread out wherever we had to go.

Most of it on foot?

No, we had four-wheel-drive. I had a four-wheel-drive pickup, and we went by vehicle most of the time, where we could. Of course, we'd have to walk where you couldn't get with a vehicle. We also went through all the prospects and down the shafts and old workings, sampling everything.

What were some of those that you went down? Describe what those were like.

Well, of course, a lot of these were real old. We went down one part way, and the ladders were rotten, and they just dropped down to the bottom of the shaft. Of course, we had a rope. We held on to a rope and went on down, and we got to the landing we wanted to get to. I went down first, and then Alan came down. Of course, we were always aware that there might be gas and so forth, so we had carbide lamps, so we were protected that way. We just went everywhere we could possibly get into.

Explain how the carbide lamps protected you.

If there's a lack of oxygen, the flame of the carbide lamp will start to leave the lamp. It just starts to get out there in midair, by itself, and when you see that happening, it's time to get out, because you know there's not enough oxygen.

So we went through all these prospects, wherever it was, and crawled over caved areas and everything else. We really looked it over carefully. This was around Battle Mountain. There was quite a good size mine there at one time out of Valmy, the Marigold Mine. Anyhow, we had quite a few samples that

ran a little bit of ore, but not anything that you could mine at \$35 gold. But that's what we were looking for—something that was big—but we couldn't find anything big that would support an open pit or something like that. That's what we really had in mind, you know. We covered a big area. We were there practically all winter, looking and searching and talking to anybody we could. We did an awful lot of work that year just looking around. Of course, the next spring I went over into the Carlin Trend area.

While you were working this big area, was this land that Newmont owned or had mineral rights?

No, no. This was just prospecting. If we'd found something, then we would have gone from there and expanded on it as much as possible. We didn't find anything that was worth going after.

Did you like going down in those old shafts?

Well, it's a challenge. [laughter] You have to be very careful, because they can be very dangerous. But I've been around those kind of things for a long time, so that's when I usually told Alan, "I'll go first and see what it looks like," because I had a whole lot more experience than he. And I wasn't quite as heavy as he was, either. [laughter] So I went down those ladders and down the shafts and so forth. Most of them were adits and caved areas. But we went everywhere we possibly could get—that's the only way I could put it—and did as thorough a job as we possibly could. We panned, and we did all sorts of things to see if we could come up with something that might be tangible.

Is it discouraging when you're out there day after day, and you're not finding anything?

Well, I can't say it's discouraging. Of course, it's discouraging if you don't find

something. That's true. But, my gosh, we do this all the time, and how many mines do you find, you know? You don't find a mine that easily. So I'm kind of used to it, you know. See, I was in exploration for about fifteen years there. Carlin was really the real first good find we had. I was in on that uranium property up in the state of Washington, but we didn't find it. The Indians found it, and we, more or less, developed it. But to find a mine is, believe me, not an easy chore. It takes a tremendous amount of work, and there's a lot of preparation work. You have to find what areas to look at. You have to go over geological maps, because there are certain types of rock that these minerals occur in, and you have to get in those areas. You can't just go look anywhere.

Where did you learn your safety measures? Was that from your early experience back in Goldfield?

Oh, yes. Everywhere that you work, you learn. And then, we took a lot of courses, too. At each mine you have safety courses that you take—first aid and so forth. So you learn from experience. After a while you know what to look for. When you go underground, you know what the ground looks like, what the timber looks like. A timber might look absolutely like it was brand new or solid, but you can stick a pick through it. It's like nothing to it; it's rotten inside. Well, those are things that you learn from experience. But no, we had some good training over the years, wherever we were, at any operation. Any operation you have, you always have training in first aid and safety and that. And you learn from any accidents. Over the years, sure, there's accidents happen all the time, although we never had too many there at Carlin, because by that time it was a new operation, and we had training for people.

But each accident that you heard about, you learned what not to do?

Oh, you learn what not to do. And then, in places where I'd been, why, if an accident occurred, we'd get the staff together and discuss what we could do to prevent this from happening again. So you learn from experience, as well as from training that you get.

Do you get to know your partner pretty well when you're exploring like that, when you're prospecting?

Oh, yes, because we generally live together. Like at Valmy, Alan and I had a room with two beds. When you eat together, work together, and sleep in the same room, why, sure, you get to know each other, and you look after each other. You have to. It's just like a buddy system in war—you look after each other.

When you went there, were you aware of what mines were actually being worked in that area?

Well, there really weren't. There was the one mine that was active there in Battle Mountain. They were mining barite at the time. There was a copper mine that had been active there, but I don't think it was working when we were there. It had just shut down, as I recall.

When you went to Carlin, what was going on around there?

There wasn't anything.

Was Getchell going at that time?

Getchell was going, but Getchell is quite a ways. That's over by Winnemucca. So nothing right in that area.

In his speech Malozemoff talked about two separate explorations: one headed by Livermore and one headed by Fulton. Was

that your understanding—that there were two separate explorations going on?

No. I saw it as one concerted effort, because Bob was the Vice President of Exploration, so everything would have been under Bob. See, John Livermore later was transferred to Canada as Vice President of Exploration in Canada. But here Bob Fulton was exploration vice president.

So, John and Alan would have worked for Bob?

Absolutely, yes.

You mentioned Bob's determination to find the mine, that that really was the driving force here.

Well, reading these reports, Bob figured that there was a real good possibility—if geologists could sort the rocks out and really be able to determine which is upper plate, which is lower plate—of us finding a low-grade deposit that could be mined by open pit. He brought this up several times. I know that all along he pushed to determine what the rocks are, to identify the rocks, to sort them out, so that he would know. Those rocks were very, very complex. I know I heard some pretty rough arguments with the geologists about these rocks. One would think one way, and the other the other way. But, of course, those discussions are good, because both parties learn from these things, and then they have to look at them a little bit closer. I don't really know if anyone ever did figure out all of them, because they looked so similar. It was tough to determine what was which.

Hard to understand exactly what happened and where it all was?

Hard to understand, yes. Well, they knew what happened as far as the thrusts go, but

some places where these rocks were exposed, you couldn't tell which was upper plate or lower plate. The consensus was that it was the lower plate rocks that had the mineralization. When the upper plate eroded off, it left what they call the windows, which would be areas where the lower plate was exposed, and that's what they were looking for. Those are the places where the USGS had found some shows of mineralization.

What was it about this area that really attracted Bob, do you think? I mean, as Vice President of Exploration, he must have been in charge of lots of different explorations.

Oh, yes. He was.

And there was something about this one—you describe it almost as a passion.

Well, it was something that he believed in, really believed that that was a good possibility. I think he wanted to explore every way he could and do it as thoroughly and as intelligently as he could. Of course, if nothing showed up, why, he'd have to disregard it. But he didn't want to give up, because maybe someone didn't know exactly what rock it was. He kept doggedly going after it, and then by drilling and so forth, why, we found it. But that is a very complex geology there, and I haven't ever heard anyone say any different. I heard some awful arguments, so I know doggone well that even the geologists there couldn't agree on everything.

Sometimes, when those arguments were going on, what did you do?

Well, I listened. I'm not a geologist, so I just listened. But when I was drilling, I didn't care what the rock was. I just drilled it. And if there was ore there I just kept following it.

So, you didn't always follow the exact pattern set out for you?

I didn't. I watched for the assays and the holes drilled, and I just kept expanding on them. I felt that was the safest way and the most economical way of doing it.

Did you follow a little instinct along the way?

Sure, you do that. You get an idea of what's going on, and by drawing these cross sections, why, you have a pretty good idea where it might be going, so you follow these.

So it wasn't all instinct, but you had a sense that it might go this direction or that direction from your mapping?

That's right. From the mapping, right.

So you were doing mapping, rather than the geologists doing all the mapping?

Well, there was nobody there. I was the only one there at the time. There was no geologist on the job. I was the only one there as far as the staff goes. Mort White came and went, because he was an engineer, but Mort White didn't really get involved. When we found the gold, we tried to keep from spreading it out even amongst our staff, because the fewer the people who knew about it, the better off we thought we were.

So there was a gap between when Alan left and Byron Hardie came on?

Right. Yes, there was pretty near a year.

Is that unusual to have that kind of a gap between geologists?

No, no, no. I've been on jobs where I did it all myself. An engineer might come out, lay some holes out or something, but I usually did all the drilling, and they were gone. Because they don't stick around to watch the drilling and that, as a rule, unless they

are sent out on a project where they're watching the drill, too, instead of me, if I'm on some other job or something else.

They locate it, set it up, and then turn it over to you, and it's up to you to do the drilling, to actually find the parameters of that ore body.

Yes. Right. Of course, we always consult with them if there's anything that comes up. Naturally, you have to talk to them.

So, Mort White was in and out, and it wasn't unusual that you were doing this on your own?

No. The reason I started doing it was really for my own information, see, to kind of guide me. All the mapping I did was just the sections. By doing the sections, why, I knew pretty well which way to drill, which direction to go. So I didn't have to go off left field somewhere with the drills. I tried to make every hole count that I possibly could.

OK, because that's a cost savings.

Oh, sure, it's a cost saving. You always want to make sure that there isn't a gap, and there's another phase of the ore body or something. So you have to follow up on those, too. But I tried to keep what I had, you know, corral as much as I could.

All right. I wanted to be clear which hole it was where you really hit.

It was the third hole we drilled on the Popovich ground.

But it was the fifth hole in a row that had been outlined.

In the row. Right. But it was the very third hole that we drilled. It was on the Popovich line, right near the border. I think

it was within fifty feet or something like that. But there was just a row of holes like that going up the hill. We drilled this one, and there was nothing in it. We drilled this one, and there was nothing in it. And we drilled that one, and that's where we hit it.

Because you skipped one hole between each of those three.

So it was the fifth hole in the row, but the third hole that we drilled.

When you were working on this, by then, were you narrowed down to a small area in terms of drilling?

Oh, yes. I'd say at least a square mile. And then, of course, we did a lot of drilling around afterwards to see if there was anything else, which gets out of that square mile. We did a lot of drilling. But it was all checking other places.

Tell me about the property ownership at the point where you were doing drilling. Where you started, did Newmont own that property or own the mineral rights?

Well, they located a bunch of claims, I think, an original claim. There were eleven or something like that of claims that they had located. I'm not sure whether it was a lease or what they bought. I'm not sure just how they obtained the Popovich ground. I'm not aware of the exact details of that. But I know that they got the eighty acres of Popovich, and then after we struck that hole, Bob got a lease on the TS Ranch property.

And then from there, did you pretty well have what you needed, or as you were drilling was there still a need to work on getting the property or the claim?

No, in that area that just about took care of it.

Later, did you have to add more?

Well, yes, later, after I had gone, they got more property down there on the gold quarry, because I think that those claims were dropped for some reason or other. But then, when they went back in there, they had to go through other people and obtain the property. But I wasn't involved in that. Once I left there I never was involved with it again.

When you were doing the drilling and getting started, were you involved at all with any officials of Nevada? BLM, Forest Service, county officials—was anything like that involved with you?

Yes, with the county officials, to help with the roads and so forth, to improve roads and that. I don't think we had too much to do with the BLM, and there's no forest around there, so there was no Forest Service. Later we got involved with the highway department, and we got the power company, telephone company, and that. All those facilities had to be brought in.

So none of this was public land that you were working on—public meaning BLM, Forest Service, that type of thing? It was all privately owned?

No. See, those claims were open ground. Call it BLM, I guess.

But as long as you had those claims located, there wasn't anything more that the BLM needed from you?

No, no. Then we patented them, and once you patent them, then you own them. Right now in Congress they're fighting to change that mining law. These politicians have the concept that the mining companies get an acre of ground for two and a half an acre. Well, they don't realize how much

money a mining company spends to *find* a mine. They don't buy this property just to be buying property. Before you can patent a claim, the government sends in their engineers, and they go over every assay, every map you have, and everything else, to determine if you have an economic ore body there to justify the patenting of that claim.

When we patented that claim and the ones that I was involved in up in Alaska, we had to show them all the assays, all the drill holes, where they are and everything else. And then that's the area that you patent. You can't go out here and patent something that don't have anything on it. When you do that, then you pay that two and a half an acre for that part. But by the time you get there, you've probably spent millions of dollars looking for a mine. Tens of millions of dollars looking for a mine. My God, it was fifteen years, and we found Carlin. In all of that time I drilled all over the Western United States. You don't find those mines like that, and you don't buy that real estate just to be having real estate, because you got to pay taxes on it. So you don't tie up ground like that. The only way you can get a patent, is that you have to show that you've got an economic mine there.

And did you go through that process, then? You were showing books?

Oh, God, yes. Well, you show them everything. You have to show them your maps: cross sections, longitudinal sections, and a whole map of your claims and everything. You show them all your assay. They actually do the calculating themselves to check our engineers that compiled all this. They check all that to see if they did it right or accurately. Then, they'll tell you, "All right. We'll give you a patent on this one, this one, this one, this one, this one." And that's it.

Where in the timeline would that have happened? At first you were being very secret

about this discovery. And then, at some point it was made public, to prevent any insider trading accusations. Where does this patenting come in—after that?

Yes, it comes after that. Before we start to build the mill, why, we get it patented so that we're sure we have the land. Once you patent them, then they're yours, and from there on, you pay taxes on them.

Let's talk a little bit now about the production phase. One of the things that you mentioned yesterday was that you decided on twenty-foot benches. Could you explain that a little bit to me—why and what that means?

Well, usually, bench size depends on the ore body, how big the ore body is, how massive it is. Also, what size mill you have, how much you're going to treat. The more you treat, the bigger the equipment, the more you have to produce. We had a 2,000-ton mill. It was originally 1,800 tons. That, more or less, dictates about what size benches you can use to supply that mill with an even flow of ore. You don't want to take a big bench where you're going to dilute the ore. So you have to fit the bench sizes to the ore body, as well. But it takes several factors there. You take these big copper pits, where they're moving practically a mountain. Well, then they use a whole lot higher benches and bigger equipment, because they have to produce a whole lot more material or ore for their plants. That dictates what size benches you have.

Bench refers to height not width?

Yes, height. You take it in depths, and you're going down. You take twenty-foot steps going down. They're all done so that you leave a berm to protect the walls and keep that angle of the slope. Pitch slope, see, so that it doesn't cave in on you.

Is that decision made before you decide what equipment you're bringing in?

Oh, yes. You decide on the size of your benches and that, and that dictates what size equipment you can efficiently work with.

The twenty-foot benches—what did that mean in terms of the equipment that you used?

Well, we produced approximately 1,800 tons of ore to the mill at that time, when we first started there. The twenty-foot benches would supply that. And we had three-yard shovels—two of those. We had a 988 loader. So we could pretty well supply the mill. We had the thing opened up, and we had a chance to blend the ore and keep it. Even when they went to two thousand tons, why, that didn't make that much difference. We could still go ahead. We always kept a stockpile at the crushing plant as a backup in case something happened to a shovel or something. It was always over there at the mill.

And the mill was two thousand tons a day for three shifts?

Yes.

In order to do these benches you're doing some blasting, correct? In the old mines you'd blast, you'd leave, you'd let the dust settle, and you'd muck it out. Describe how that worked in this case, in the open pit.

Well, you drilled the benches out. We were using four-and-three-quarter-inch holes, and then we went to some six-and-three-quarter-inch holes. You generally drill about three feet in the twenty-foot bench. We drilled about three feet below the twenty-foot benches, so that we'd be assured of breaking down twenty feet. We used ammonium nitrate, and with our experience there, when we shot, we didn't scatter the mate-

rial. It would just kind of raise it up and drop it down, so that we didn't mix the material up that much. Every hole that was drilled was also assayed. The engineers would go back and reestablish that hole and mark it, whether it was ore or waste, and they put up the laths with the blue ribbons or the red ribbons. Then we could go from there.

So the goal was really just to loosen it up?

Well, it just loosened it up, so that either the shovel or front-end loader could move it. Usually every morning, what I did, when I went out there, is go out and take the assays off of those holes and average them out. Then I could tell the foreman, "OK, you take so many tons from here, and then so many tons from this other area," to get it blended like we wanted. That's how we handled it.

Where did you get your experience in blasting?

Oh, good Lord. I was blasting with my dad when I was a teenager, or before I was a teenager.

And what were you using then?

Well, that was strictly all powder then, dynamite. We used dynamite and caps and fuse at that time. That's mostly it, because he did a lot of assessment work for a company, and I helped him. My gosh, I was using dynamite . . . ah heck, I don't even know how old I was, but I know I wasn't very old the first time. In fact, I used it to break up those old knotty pines. We used to get that pinion-pine wood for wintertime, and it would be twisted up and almost impossible to chop. So my brother and I drilled a hole in those logs and put a little bit of powder in there, and that would crack them up, and then we could break it up. [laughter] So we used powder, oh, way back. I really don't know when I did start using powder—of

course, with my dad. I was pretty doggone young.

When did you start to see the change to this ammonium nitrate?

Well, that happened in the 1950s when I was at the Dawn Mining Company. That was probably early 1950s. Isbell Construction had a contract there to do some initial stripping, and they were using ammonium nitrate. That's where I learned to use ammonium nitrate.

Was it quite a bit different?

Oh, yes. Because that's a prill, and it comes in bags, and then you have to mix diesel oil with it, and that makes it explosive. But you have to have some dynamite or something to initiate it, because it won't go off by itself.

That's also the first place that I got involved with Prima-cord, because they were using Prima-cord there, also. With Prima-cord you don't have to put caps down the hole. You can just use the caps to set the thing off. So that was a little different thing, and, of course, that was a whole lot more economical.

You must have had a pretty good sense of the amount of dynamite and so on. Was it quite a bit different to learn the ammonium nitrate?

No. Ammonium nitrate is slower than dynamite. It shoots a little bit slower than dynamite. In real hard rock you may have to use a little bit more, but, no, we never had any trouble at all. We made some fantastic shots, where we didn't hardly disturb the ground, at all. Gee whiz, up there at Dawn, when we were building bins, we just carved the thing out with nothing but blast hole, using ammonium nitrate. Cut the walls straight down to build ore bins. Gosh, been

using it for years. It just kind of comes natural, and it really was no problem, whatsoever.

You said you just basically raised and dropped the material and didn't really mix it up. Is that something new, or is that something that just went along with open-pit mining?

Well, we were trying to keep from diluting the ore. We experimented with it till we got real good at how much powder to put in the hole. By timing it, it would just, more or less, offset those rows of holes very little, and you just broke it enough so you could dig it and still keep the hole thing fairly well intact.

Because the material changed so much from one spot to the next. Is that right? You showed me a picture, for example, where there was some of the carbonaceous next to the regular oxidized ore.

Yes, and we could mine right to it. Of course, sometimes, if you get a little bit in with it, it doesn't matter, but we tried very hard to keep it as clean as we could. And we did. We did, I think, a good job. Shovel operators and that were well trained, and they knew what we were after, so we didn't have any problems.

You said that they assayed those holes, and you used those assays every morning. Is that where you used this atomic process that you were telling me about?

Yes.

Explain that to me again.

All of the assays were assayed by Atomic Absorption, there, after we got started with it. If I drilled today, see, tomorrow morning I'd have the results. So then, the engineers would go out, and they'd mark the holes. Then, all I would have to do was just go out

and check that number, find out what the assay was of that hole number, and get these various holes and average them up and see what it would average to. Then, move to the next area. If that was fairly good grade, I'd go to another area where the grade wasn't so good, and we'd blend these, so that they'd get an even—as even as you could—grade going through the mill.

It was a whole lot faster than fire assaying. Well, fire assaying—you have to run the furnace. You have to pulverize. Of course, you do with the other, too, but they use cyanide in AA, and get it in solution, and then they use the spectrometer to match that versus the curve that they develop. But with the fire assaying, you have to melt it down and get your little button, and then you have to weigh them all and so forth. So it takes, probably, another man or two for fire assaying. Then, of course, they both have to be prepared about the same, as far as pulverizing them, grinding them, crushing them, and weighing them out and so forth.

Where was the assaying done? Was that handled over at the mill or right there?

At the mill. We had an assay office right in the mill.

And who was in charge of that?

That was Harry Treweek while I was there. Well, Harry had retired. There was another fellow that took over after Harry left, Marvin Rasmussen, but he got in trouble. After I left, they high-graded a bunch of precipitate and got in trouble. They got caught.

High-grading still goes on then?

Well, it did then. He was the assayer, and he was fudging on the assays, so they wouldn't notice it was gone. He was selling it to somebody in Grass Valley, California.

At that time, whoever bought the gold had to have a license, and he had to report it, and he reported more than his license showed. Then, the secret service wanted to know where he was getting his material. He said it was coming from Carlin. Well, they put one and one together, and they thought, well, they'll entrap him. So then they disguised themselves as buyers, and they told him they wanted a bunch. He said that they couldn't get him a bunch until the fellow that was running the refinery was going on vacation. See, then they'd be in charge. [laughter] So when this old boy went on vacation, they got a bunch of it, and they went down in Grass Valley, and he opened the trunk of the car and showed him the precipitate. This guy had this big roll of bills, and so he started counting out the money, and as soon as he gave it to him, why, he arrested him. That was after I left, but I'd heard about it. I was up at the Idarado at the time.

You see, he was cheating on the assay. He was reporting them lower than what they were, so that he could go ahead and steal, and then he wouldn't be found out. But after I left, the fellow that took my place wasn't checking assays of these holes like I was, because when I took the assays off of those holes, I had a pretty good idea of what the assay was going to run, and when it didn't, I'd go down there and find out what happened.

What happened? Well, he always thought that the guy that was bucking the samples messed up, see. And then, I'd get another sample. They'd come out the way they were supposed to. So I think that might have kept him from stealing while I was there, because I was watching too close. I had no idea that anything like that was trying to go on, but if they weren't matching, I wanted to know why, because if there was something wrong with our marking of the holes or something, I wanted to get it corrected. And just inadvertently, I kept him from stealing. Then it

all came to me after it happened, because he was assaying and reporting low assays, so that it would cover up his theft.

Theft. It strikes me that in the early days of gold mining it was easier to high grade than it is with this microscopic gold.

Oh, well, yes. You can't get gold like that.

So only somebody in a position like assaying or something like that would be able to do it?

That's right, only the assayer or the people working in the refinery where they're actually pouring the gold. But we had a little Basque over there that was running the refinery, Steve Uriola, and he was as honest as the day is long. He wouldn't have stole anything. And this guy knew it, see. He was waiting until this guy left. At night he'd go in there and take a little bit while the guy was there, but he didn't dare take very much, because I think that guy would have got suspicious. But Steve Uriola was a good man. He was a good man. But anyhow, that AA machine—I'll bet you everybody's using it today.

But it was new at that time?

It was fairly new at that time. That was the first time I've seen it, and I'm pretty sure that Elmer Perkins made that. That was a company that made the AA machine.

So, nobody from Newmont created this?

No, no, no. It was on the market at Elmer Perkins Company.

Let's talk a little bit more about the men. You mentioned to me this morning something that we hadn't gotten into yesterday, and that was a union. You had a union at the Carlin Mine?

Yes. Not too long after we got in operation, why, they held an election, and the operating engineers got the contract for them.

And what kind of an impact did that have?

Not really much of anything.

You would have been in management, so you wouldn't have been a union member?

Oh, no, I wasn't. [laughter]

And your men would have been? Your men that worked for you were?

Just the laborers. No, not laborers, but the hourly people were on it. But they didn't really impact us very much. You know, when you have a contract, then both sides have to live up to that contract as much as possible. Sometimes it works for the benefit of the people; sometimes it doesn't. When you sign a contract, you can only pay those guys what's in the contract. But a lot of times, you get a real good man, or even more than one good man, that can do something, that you'd be real happy to pay him more, but you can't, see, because you can't overdo what's on the contract. You have to abide by the contract.

Did you feel like that a couple times?

I had a couple of excellent men that I'd have been glad to give more money to, but couldn't.

Was there ever any dissatisfaction among the union members, any conflicts or issues that you had to deal with?

Oh, every once in a while you get one, yes. We had one fellow that tore up a front-end loader trying to lift a frozen slab out of the pit. He was hooking the point of the

bucket under it to try to break it off loose, you know, and tore the bottom of the bucket out. That went to arbitration.

Because what happened when he did that?

Well, he tore the bucket up, and then that piece of equipment was down until we could get a replacement for the bucket or repair the one that was tore up.

What kind of action did you take?

Well, I fired him. He contested it, and then we fought with the union, and I don't know, they figured that the guy was just trying to do his job, and we had to put him back on. We had to pay him back pay, and then, of course, when he got the back pay, why, he quit. He got rich all of a sudden, and he quit. But that didn't last long. Then, of course, he came back and wanted me to re-hire him. There was no way in hell I'd have ever rehired him again.

Because from your perspective he wasn't doing his job.

That's right. He wasn't doing his job. He had no business abusing equipment. Anybody knew that. You don't abuse equipment. That slab could have been blasted, or a dozer could have ripped it out, or anything else. But he was just playing around, and nobody else could ever convince me otherwise. When he came back to ask me for a job, why, I told him, "No way. No way. You just go find yourself another job, but you'll never work for me again."

Was that the only time that you really had a major conflict?

Yes. That was the only time. That was the only time that I can recall that anyone did anything very serious.

I'd like to talk to you a little bit about various changes that you've seen over the years. A couple of things really strike me. One is that you were born and raised in Goldfield, and you got a background in Goldfield, where some of the most wealthy mines were back in the turn of the century, and then you got to start the Carlin gold mine—that's a pretty big connection.

Well, yes. Oh, there's always been a big thing for Newmont, especially Fred Searls. See, gold was a big thing with him. I think he got started in Goldfield, and then he went to Grass Valley. He was associated with gold an awful lot. Fred had some big ideas about Goldfield, but they were never proved, because we could never get drill holes down where he wanted to go. But to this day I think that Fred Searls may be right, and some day Goldfield may be another big gold mine, because he felt that the mineralization may be under those Sieberg Lake beds, west of the mining districts. We were never able to penetrate those to get down there to check that out, because we just had too much trouble with the drill holes to get them down to where he wanted to go. But some day they will, I'm sure.

Had you ever thought about your connection of being born and raised in Goldfield where one of the richest mines was, and then starting Carlin, another one of the richest mines in Nevada?

No. [laughter] I never really gave it a thought, but it is quite a thing, and I'm tickled to death that it happened, but of course, I'd been on so many prospects, you know, and drilled so many prospects that didn't turn out. That one did, so I was just happy that it happened. But I never really gave it a connection. Of course, it's altogether a different kind of gold. In Goldfield, boy, when you hit high grade you knew it. You could

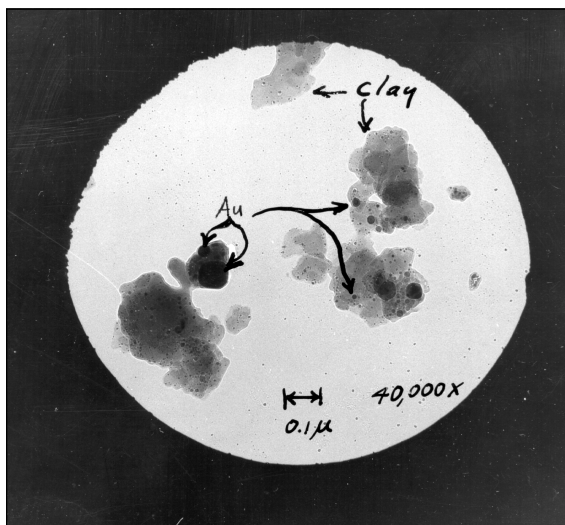
see it, and you could pan it. But this (microscopic gold), you could get a piece of rock that had two and three ounces of gold in it, and you'd see nothing. It doesn't even look like a good throwing rock. So, it's a lot of difference.

When did it really hit you? Was there any one moment that it really hit you—what you were working on at Carlin?

Oh, yes. After we got a few holes drilled, and then we saw that this thing is expanding, and then we moved to another area, and we found that it was still going on. And bam! I'm telling you, you bet your life. Boy, there were times there that I could hardly wait to get up there and go to work. You know, you just get so anxious. You want to punch as many holes as you possibly could. So, you bet, you get excited.

So, it was really hitting you right as it was happening?

Oh, yes. I was out there Saturdays and Sundays, just looking around. Yipe! I couldn't hardly believe it. I was envisioning a big old hole out there. So, you bet your



Microscopic gold.

life, it gets to you. Of course, at that time, you didn't dare say anything to anybody. So I was laughing to myself all the time going up there. [laughter] I was just tickled to death. You bet. That was a thrill of a lifetime. Yes, even my wife was saying, "Boy, you're in a hurry to go to work!" [laughter] But I was leaving a little bit earlier every day, it seemed like. That gets to you. It gets in the blood. It gets in the blood. Believe me, I don't have any regrets. That was a highlight of my life, my mining career, was that Carlin discovery, believe me.

Do you still sometimes marvel at what the impact of that was?

Oh, yes, lots of times.

Even though you knew it was big then, do you look back at it now and say, "Even then, I didn't know how big it was?"

Oh, yes. Yes, you bet. There's times you wish that you could have done things a little different. If you'd have known that some of this ore was really way down at depth, you could have gone down with diamond drill holes and diamond-drilled it. And yes, it could have been a whole lot bigger at the time.

Really? With what you know now, if you went back, you would have done it differently?

Possibly, yes. I think in that Gold Quarry area, where we were drilling, it was so hard. A lot of that was quartzite, and, boy, that was hard, I'm telling you. We had down-the-hole hammer, and that thing was just hammering, hammering, hammering—barely moving. So, those holes didn't go down very deep, because we had to change bits too often. Then pretty soon you get to the point that your bits are so small that you

can't turn them, so you have to quit. But that would have been a good place to have a diamond drill and go on down through that.

But even then, you didn't know how deep it went?

No, no. And not only that, but we didn't really find anything that was that encouraging. Everything was fairly low grade, like .10. I think the best assay we had was .15, which wasn't very much in thirty-five-dollar gold. And diamond drilling is a whole lot more expensive. To put a hole down 500 or 600 feet or 1,000 feet would have cost quite a little bit of money.

That seemed beyond the gamble that you should have taken.

Yes, at that time, you bet. But, you know, it sometimes pays to do that. I don't know.

Well, it sounds like you thought you were taking some risks at that time.

Oh, yes. We were. We were doing all that drilling, and it was a lot of cost there, and we really didn't come up with anything. Of course, when we moved up there to Carlin, why, it was a different story, because we had enough good ore to make it pay. Boy, you get a hundred feet of ounce rock, man, I'll tell you, that was something. That was great. [laughter]

The kind of thing you dream of at night, right?

Yes. That's right. It's almost like winning the lottery.

Did you have any idea it would still be going today?

No. Gosh, no—not at thirty-five-dollar rock. When I was promoted and transferred

to Idarado they told me, "Well, this place is only going to be going for maybe another two or three years, and it will probably be closing down." So the Idarado seemed like, it would be going on forever, because they had been going for a long time. [laughter] Here it was just opposite! In the fall of 1978, I closed Idarado down, and Carlin was still going. But of course, gold jumped from thirty-five dollars . . . gosh, they went up to almost eight hundred there one time. Yipe, what that would have been at that time. Oh!

When you first found it?

When I first found it. My God! I think there would have been some champagne bottles popping, I don't know. [laughter] Holy Smokes! Imagine a hole with eight hundred dollars an ounce of gold. Wow! Hundred feet of it. It would have been fabulous.

You know, a strange thing happened. There was a guy came by the mine one time—my office. I think he was with ASARCO, I'm not sure. But he was saying that Newmont ought to shut this mine down. We'd been going a couple of years.

I says, "Why?"

He said, "Shut it down, and wait for the gold to go up."

Who would ever have thought the gold would go up? Yes. "What are we going to do in the meantime? Starve to death? You can't shut the mill down and deteriorate, waiting for the gold to go up." But, my God, just a few months after I left, it started to climb. Couldn't believe it. Couldn't believe it. Of course, the higher it went, it just meant that many more years that Carlin would operate. Then there was a lot of this material that we couldn't mine. It wasn't economical to mine. With the leach pads they could always leach those and get some gold out of them. And my gosh! Because they had to move the material, anyhow.

Some of the stuff that we were throwing away as waste would now be ore. I think they're treating everything now down to .03. And my gosh, at thirty-five-dollar rock that was waste. But you know, a lot of that material you have to move, anyhow. So what they were doing is, they made these leach pads and stockpiled it and then started treating it. Heck, they were getting the gold out of it, and that's very economical, because it's a bonus, really. About the only cost to it is the cyanide that they have to put in and building the pad. But gosh, these are thousands of tons that they leach at a time.

So they added the leach pads later, in addition to the mill, and had both of them going?

Yes. We started a small leach pad while I was there, but this was only a very small one, because we didn't have the facilities at that time. At thirty-five-dollar gold there wasn't very much that we could leach. If it was any kind of grade at all, it went through the mill. But then, after the price of gold went up, all that stuff that was about .03 or .025, why, that all went into the leach pad, and that's just a matter of adding cyanide to it and collecting it and putting it through precipitation. Or electrolysis, I think, they did there.

One of the things that's happened is that those communities have grown. Did you expect Elko to grow?

Well, Elko grew while we were there, but nothing like it did later, because growth went up, and then some other companies went in there. Gosh, you could imagine, when it went from 135 to 3,000 men, that's quite a boost in population around there. Because you take every man, and you could almost multiply that by three or four for a family. So that means an awful lot of people.

Your family lived right in Elko, and you traveled back and forth?

Oh, yes. We lived in Elko. I went down there first in July or August; I was just staying in a motel. I went down there single status. I could see where, heck, I'm going to be here for quite a while, so I got a hold of Bob and said, "Bob, why don't I just move down here?" I said, "There's no point in me living in a motel here by myself and the family up in Spokane. Looks to me like I'm going to be here for awhile."

He said, "Sure, go ahead."

So, then I moved the family down, and first we rented a place in Elko, until we could really see what was going to happen. Then we bought a house there. Elko was a very, very good place to live. We really enjoyed Elko.

Did you get involved in the community?

Well, not so much over there. I had to spend too many hours working. I'd leave the house—gosh, I don't know what it was—five o'clock in the morning and wouldn't get home until five or six o'clock at night. You just didn't have time, see. Didn't have time. And there are a lot of times where, because you get home, doesn't mean that your job is over with. There's phone calls; there's things that you have to do, people to contact, and firms to contact, and that. So I didn't have the time. But, of course, here now it's a different story. I retired.

You can do all those things you didn't have time for.

Right.

Did you take family vacations?

Oh, yes. We had a couple of weeks vacation. We went to visit Naomi's folks, you

know, family. They were still in Maryland. We would travel by train and take the whole family. We took my mother a couple of times with us, and we would travel. Oh gosh, we'd make trips to California and back up to Spokane, Washington. Oh, we did traveling. My mother was down in Goldfield, and we'd go down there a lot. We went to mining conventions and things like that. Usually, anywhere we went, we'd travel to see the country. We wanted to see the country as much as possible. So, anytime we had a day off, why, we took off.

Did you ever take the kids out to the mine?

Oh, yes. That oldest boy of mine, Pete Jr., usually every weekend he'd want to go up to the mine with me.

He was interested. Is he the one that went into mining?

Yes. Pete Jr. is a mining engineer. He even worked for me up there for a while. See, when he went to work, I told him, "Just because I'm the boss, that doesn't mean that you're not going to work." I said, "You're going to work harder than the other guys, because I don't want them to say, 'Ah, yes. You got to playing favorites.'" I really didn't. Believe me, they did a great job. They did a great job. I was tickled to death to have them.

So, the kids knew what you were doing. They knew what Dad's job was.

Oh, yes. I took them every chance I had. Then we hunted together all the time, and it was usually around the mine there—chukars and that. And gosh, they were small, but we'd go out shooting targets, you know, these clay pigeons. We'd come home and bring all those empties and reload them. I had them doing all that. We had a lot of fun. Even though I was gone a lot during explo-

ration times, why, still the family was number one all the time.

You really enjoyed spending time with your kids.

Oh, yes. We had a boat, and we'd go fishing all the time. Gosh, we used to catch some of the biggest fish there in Elko—that bass on the marshes. But my son lost more lures than any ten people. He'd cast out in the tules. That's, of course, where the big fish were, but sometimes, gosh, it would be five or six dollars in lures by the time he caught a big fish. But he'd always brag about catching the biggest fish. [laughter] We did have a lot of fun.

We had a lot of fun with the kids. It's surprising that when we were home they didn't go out very much. They were always at home. We always played together or fished together or hunted together or did things together. And then, I had a jeep. When Peter got big enough, he wanted a motorcycle. I wouldn't let him have a motorcycle, but I got him a jeep, one of those old army jeeps. It was a wreck, but we tore it all down and overhauled it and everything. I let him help with it. Then I gave it to him to drive, and he was happy as a lark. But anyhow, our family was always a good, close family.

It kind of helps when you have to move.

Oh, yes. They got to be experts at it. They had their stuff, and they'd pack it all, so they'd know what they had and where it was when they got to the next site. In fact, we moved to Spokane a second time, and we hadn't even unpacked all the boxes yet. We were eating supper one night, and Peter says, "Dad, when are we going to move again?" [laughter]

I told him, "My God, we just got here!" But you know, I think, we were there only a couple of months. The house wasn't all that

great. And we wanted to get a little better house, so we did move, but it was just down the street to a better, bigger house.

But I don't know. The wife and I talked about that and said, "Boy, they're getting to be regular tramps! They want to be on the go all the time."

I want to ask you a couple other questions about changes. When you were first doing the exploration work in the early 1960s, were women doing any mining at that time?

No.

Not anywhere in mining? Were they in the offices or anywhere?

Oh, yes. In the offices, yes, we had a lot of women in the offices. Not out in the field, no. The first woman that I hired underground was up here at the Idarado. That would have been in 1974 or 1975. But anyhow, she came to me, and I told her, "I can't hire you underground. No way." I says, "We have no facilities for women." I never heard of a woman working underground, you know. It's not a place for a woman. Boy, she kept coming, see, and she was determined to go to work. So I told her, "Well, you stop and think. There's probably each shift two or three hundred guys working. And getting you alone underground?" I said, "I don't know why you'd want to do that." I said, "Our toilet facilities underground aren't made for a woman."

She said, "Well, you don't have to have a separate one for women." She said, "They don't have them on an airplane."

I said, "Yes, but you go in the airplane, at least you can shut the door! You know? And nobody can get in. But," I said, "Out there, it's right out in the open."

Well it didn't seem to bother her, and she could live with that. Well, then I told her

about the change room. I said, "My God! Now I don't have a change room or a shower for women!"

Well, she didn't care.

I said, "You mean to tell me you'd get in there and take a shower with a couple a hundred men?"

"Well," she said, "that's quite a few, all right."

Well, there was no way in the world that I was going to do that, but I knew that I was going to have to do something, so I had them make a new little change room and shower for the women, and we had to get those restrooms underground enclosed with a door on them and all that sort of stuff. I finally hired her.

What made you think you had to do something?

Well, she was so insistent, and she said she had a right to do it. Well, I didn't know that she had any kind of a right, but still, all in all, if she wanted to go under there and work, why, maybe she'd stay. Well, I guess she did. She stayed until we shut it down. But you know, I asked her also, "Now, you know, about the only kind of a job I can give you . . . I know that you're not strong enough to start working the machine mining."

"Well, no." But she said, "You got those automatic or those little hoists underground."

"Well," I said, "yes, but the guy that runs that little hoist has got to load those cages. You got to handle those heavy machines. You got to put timber in those skips and all that." I said, "You think you could do that?"

She said, "Yes, I can do that."

Well, you always think when you're doing this that, if she gets hurt, then the company is in trouble, because any accident costs you money. And the first thing you know, they would be complaining their back

had hurt or something like that. And yipe! Those things can go on for months and months. So anyhow, she did, but what happened, she conned the miners to do all this for her. I told them, "You shouldn't do it." I didn't tell them not to do it, but I told them, "You shouldn't do it." I said, "After all, she claimed that she could do it when I hired her." But anyhow, they got along, and after that there were several of them that worked underground. To this day I don't understand why a woman would do that.

But you saw it start to change.

Oh, I could see that it was starting to change, yes.

Not so much by publicity, but by women actually showing up on your doorstep wanting jobs.

Oh, yes. Wanting jobs, yes.

Did she have experience? Did you ever figure out why she wanted to do that kind of work?

No. She said, "The money's good." And she said she wanted to get in on that good money, because we did—the mining companies pay good. So that's what she wanted.

So, afterwards, we had quite a few of them, but most of them were in those kind of jobs, running those little hoists. But then we automated most of those and got rid of a lot of that, too.

In the early days there was a superstition about women being underground. Was that still kind of around?

Well, I don't know. You hear all kinds of stories, but you never know whether to believe them or not. I think it might still be, but in some places, maybe some people, but I think the younger generation got used to

it. I told her that, too, you know. "There's a lot of these guys been mining all their lives, and then they quit because of you going underground."

Did you have any men who complained about it?

No. I used to get complaints from the guys' wives. I don't know how many phone calls I got, and they said, "How come you hired a woman?"

I said, "Well, I had to hire her. I can't discriminate."

"Yes, but you know they ride in the mantrip."

I don't know if you ever seen a mantrip. That's just like these little cars, like you see the mine cars out here. Well, a mantrip is a little bit wider. They're longer, see. They have a bench on each side, and you sit there, and if you're sitting on that side, and I'm sitting on this side, your knees have to go between the other guy's legs, see, because it's so narrow. And then they were complaining, "Oh, yes, but those girls go under there." And then they said, "These guys are messing around with them." She says, "I don't want my husband to be messing around with any woman."

"Well," I told her, "that's your problem. I can't tell your husband what he can do and what he can't do." But I said, "I can just tell them that I don't want that kind of stuff going on." I said, "If they do that in the mantrip, there's nothing I can do about it. See, that's up to her. And she can just slap their face, you know, and stop it."

I don't know, at first I got quite a few of those calls. The wives were irate. They didn't want their husbands riding with a woman underground. But the men didn't complain. I never got a complaint from the men, that I know.

But it started to change?

Oh, it started to change, yes. It started to change. Boy, there was one time that I went up to this stope, and this gal was running this little hoist. There's three men up in the stoke, and she's running the hoist down below. I went in there to see if I could get the cage and go up. She had a little dog-house that the hoist is in. She had pictures of nude men! I was shocked, and I said, "Who put these up?"

She said, "I did."

"Well," I said, "I'm going up in the stope. When I come back, they better be down."

And she wanted to know, "Why?"

I said, "Hey, look, young lady. You are here by yourself with three men up there. And you putting these kind of pictures up," I said, "you are asking for trouble. Now, I don't want those up there. You take them down."

And she says, "Well, the men have pictures of nude women in their lockers."

I said, "They're in their lockers." But I said, "And besides they're all men. There's no women in their locker place." I says, "But here, where the men are coming, and they see this, you're asking for trouble."

Well, she complained, but I said, "Well, I'm not going to tell you again. But when I come down, if they're here, you're going down the road." When I came down off there, they were gone.

It was really a safety issue.

Well, sure it is. Well, it's common sense. But I don't know what's wrong with this younger generation. They're different, believe me, they're different.

Yes. They want it equal.

I guess they want it equal. But that puts management in a tough situation, because you're between a rock and a hard place. You've got to hire them, and yet, you've got to protect them. And if they don't want pro-

tection, what are you going to do? Because, after all, they have to look after themselves, too, same as anything else. That's like the men. When I go in the stope, first thing I do, I look around, make sure everything is safe. And then, when I see something, I'll tell them, "Well, there's a slab there. Take it down." Or I'll say, "There's nails in the boards sticking up here. Get rid of that."

They say, "How in the heck do you see all those things?"

Well, get them trained to do that. I'm looking all the time. I say, "I'm looking after your guys' safety."

Well, they didn't argue. They'd just take care of it. They just don't see it. They work there. And I don't know why they don't see them, but they don't. I have had miners that were absolutely fantastic. You could go in their work place, and it was neat and clean, and everything was safe. Those kind of guys always made the best money. I tried to point this out to them. You keep your place good and clean, you keep it safe, and you're going to do better. Usually, they did. Boy, I've had some there that were crackerjacks, boy. They made double, earned good money. They made more money than I did, and I was running the place. I mean, they did this consistently. But they were on contract. That didn't bother me, because if they were making money, I knew they were breaking the material, and that's what they were there for.

The fact that women could be hired to work underground came along. What other changes have you seen?

Oh, yes. There's changes in all sorts of things. Now the transformers are all different. You can't have this oil in them anymore, like they used to. And that's, well, a big thing. Now you have to have escape routes everywhere, from every area. You have to have, of course, ventilation, but that was always something that you kept up. And well, your changes as far as you have to have both men

and women. So that means that you have to have two different types of facilities, which you never used to have. Change room, restrooms.

The equipment has changed dramatically, I mean, from those days when you were running hoist in Goldfield.

Oh, yes. As far as the underground, they've made more machines that are lighter, that are more efficient. Gosh sake, those old liners we use to have to drive drifts with. They've replaced those with these jacklegs now, that are much simpler and lighter and faster.

What's a liner?

A liner is a big machine that you set up on a bar. You have to set up a bar and a cross arm on it, and then you mount the machine on it. It takes about two men to lift it on an Ingersoll DA 35. Man, I'm telling you, they were killers. And they drilled good. I mean, once you got them set up and that, they drilled good, but they were slow. It took so much time setting up and moving them and that sort of thing, changing from one hole to the other. But now a lot of that has changed.

And the jackleg—what is that?

Well, the jackleg is a little drill that you can either drift with, or some of them have a leg on it, and you can run raises with it. But most of the time they use them running drifts.

Running drift is what?

Going horizontally.

And running raises is?

Going up. Now, if it's a big drift, why, they generally have jumbos for them, but those

small five-by-seven drifts, you generally run with a jackleg.

When you were first starting to work in Goldfield as a young man, they had water on their machines, so you didn't have to deal with the silicosis and everything.

Oh, yes. Dust. But still, all in all, once you blast, you'd be surprised how many miners will just go right in there and start mucking. Well, a rule is you wet that muck pile down good, and then you wet it as you muck to keep the dust down. A lot of them won't do that. That's something that we always had to get on them about, because they get in a hurry. They want to get the thing mucked out so they can start drilling, because they're paid by the footage. But most of those things haven't changed, as far as the dust and the water in the machines and that. And then, of course, your open-pit equipment—it's grown so huge anymore.

Because you saw it go from underground to open pit. That's happened in your working career, too.

Yes, as far as mining is going. But, yes, with the smaller trucks and smaller shovels and that, as far as the hard rock goes. Of course, they had big equipment in these big copper pits and that, but we didn't have any smaller pits in the mine that I was working in. Now there are 200 and 250 and maybe 300-ton trucks.

Now they can put in one truck what some mills were built to handle in a day. For example, I'm thinking about the mill at Blair, Nevada, which was 100 tons. So a 300-ton truck can haul three times what that mill could handle in one day. That's really a perspective on how that's all changed. Blair was before your time, of course, so that wouldn't have been in your lifetime.

Well, that little mill in Goldfield was something like, I think, around 100 tons a day.

The first one you worked at?

Yes. The first one. The one that Newmont had—I don't think it was much more than that.

And you helped develop a mine to fill a 2,000-ton mill.

Yes. But now, man, they have these hydraulic shovels—twenty-five yards, maybe even bigger now. But, they were unheard of when I first started there. Unheard of.

Were they unheard of still at Carlin?

Oh, yes.

You didn't have hydraulics there?

No. No, they didn't even have that size. See, that all happened here in the last twenty-five years. It was certainly since Carlin, that's a cinch. The first hydraulic shovel that I used was at North Carolina in 1979. We had two Caterpillar hydraulic shovels working there. I'm sure that they have those big ones at Carlin now that will dig twenty-three or twenty-four yards.

Does that also mean their benches are higher now?

No, they might still be twenty-foot benches, depending on the ore body. I can't answer that, but I think they are twenty-foot benches.

Have you been back to Carlin?

I haven't been there now for, probably, ten years. But I did go back several times,

gosh, yes. When I first came back they dedicated that Gold Quarry plant in 1985, and we were in on that. I've been back there two or three times afterwards.

And you've been back to Elko?

Oh, yes. We go through there, going to Reno to see Danny, our son, that lives over there. Of course, three of our children graduated from Elko. After all the chasing around we did over the years, they all ended up graduating in Elko, except David, the youngest one. He graduated here. I think he was a junior in high school when he came here to Montrose, Colorado.

So, it gave your family a little stability there during those high school years.

Yes. Poor Carolyn, when she first got to Elko, we had to list the schools she had attended. It took a whole page. [laughter]

Every few years you moved?

Well, there were times that I moved a couple times in a year. They'd say, "Well, this job might last for six months." And you move, and it might last a month or two. Then I'd have to move back and then move again. But that didn't seem to bother us. There were always new places, new things to do. New part of the country.

Are there still the tramp miners that move around from one property to the next, like there used to be?

Well, boy, I'll tell you, mining is pretty well shot anymore in this country. Environmentalists have gotten on mining so bad that it's becoming more and more difficult, especially underground. I don't know what's going to happen. If we have to import everything, why, we're going to be in trouble.

And that's a change.

That's a change. The environmentalism. Big. Oh, yes. You know, a mine does not destroy very much of anything. That's a funny thing. They don't destroy a very big area. You can take a ski area, and they'll destroy and take out thousands of trees and make these big cuts all over these mountains. And nothing, you know. That's fine, see. But if a miner goes out here and chops a tree down, they'd pretty near hang him! You know, it doesn't make sense, doesn't make sense.

You're really seeing that here in Colorado right now?

Oh, yes! Look at all these ski areas here in Colorado right now. That's fine and dandy. They can do anything they want! They can tear up a whole mountainside and put in a village and everything. That's fine. But a mine—Telluride—they've been mining there for over a hundred years, and they didn't hardly destroy a hundred acres. And it's costing millions of dollars to try to reclaim all of that. There's nothing said about the ski areas. All the rich and famous go there to play, and that's fine and dandy. But a poor old miner trying to make a living, that's no good. And I don't think it's right.

I know a lot of people are telling me that the good mining jobs are now in other countries.

That's right. Well see, we are forcing them out in other countries. My gosh, you got to wait sometimes a year or two to get a permit to gold mine, which is crazy. You have to have those environmental impact statements. Why, it's impossible. It's just getting impossible anymore. Sure, they're running them out. They're all going to foreign countries. And then, when we have to start importing all that—what if we have another

war? If they think they're going to go out and find a mine overnight, they're crazy! There is no such thing.

You explored for fifteen years, and then were lucky enough to be part of the Carlin.

That's right. I don't know what their thinking is, to destroy an industry like that. I just don't see it. *Everything* depends on the metals being mined. I don't know. It just don't make good sense.

Everything that we use, you're talking about?

Everything that you use. I got a sign on my two vehicles, "If it isn't grown, it has to be mined." And that's just about it. That comes from the Nevada Mining Association—their bumper stickers. I got those here, because it's the truth. You hate to see that. You know, when Lamb was the governor, he'd stand there at Cripple Creek and Victor, and he'd point at those old mines, "Just look at here! They raped the ground and then left!"

How in the world did he think that Colorado was settled? Look at all these ski areas. Almost every one of them is an old mining camp!

Mining came first.

Sure, the mining came first. They settled the thing and built the towns and so forth. Then, they'd come and take over. They don't want the mining anymore. And for me, I don't know, I guess I'm just an old hard-headed miner, but I don't think it's right. I hate to see that happen because, that's what doomed Japan. When we cut all of their sea lanes, and they couldn't get supplies, they got in trouble. They don't have mines. They have to import everything. We're getting to be in the same boat, where we have to im-

port everything, and where all the good jobs are out in the foreign countries. Who in the heck is going to take care of all the things here? They have to have schools; they have to have roads; they have to have the taxes for all this stuff. If you don't have the jobs, who's going to pay for it? I hate like heck to see you have to buy everything from the foreigners. We ought to be good enough. We got things here in this country. We ought to take care of ourselves.

So, really, one of the concerns that you have is that there have been some destructive changes in mining.

Oh, absolutely, absolutely. They won't hardly let you stick a pick in the ground anymore, anyway.

The job that you had, starting the Carlin, doesn't exist anymore.

Doesn't exist anymore, right. Any of the things that I used to do doesn't exist anymore. So, you can't do it anymore. It would take you a couple of years even to get started.

It's not that long ago. That's thirty-five years ago, we're talking about.

Yes. Right, right. But anymore, it's become such a huge bureaucracy. The democracy is supposed to be where majority rules. It doesn't! Majority don't rule anymore! It's those that howl the loudest and got the most money, I guess. They take a few environmentalists, and they shut a place down! You know, or ruin the whole industry. It shouldn't be. That's like the peanut butter in schools. You know, a kid gets allergic to peanut butter, and they ban the peanut butter in all the schools in the United States! Now, if that isn't stupid, I don't know! Now, you would think that if you had a kid that couldn't stand peanut butter, you'd take care

of him. You'd tell him OK. And you'd go tell that teacher, "I don't want him to have peanut butter. If you have peanut butter, let him sit over here by himself." You don't take the privilege away from everybody else because of one kid. It's crazy. I don't know, now they're doing it on airplanes.

Is your son still in mining?

No, he's retired.

I was just wondering if you still know people who are in the mining industry. Do you know people who are trying to operate under this new situation?

Well, no. I've kind of lost touch. There isn't a whole lot I can do about it, anyhow, so I don't get involved in it, anymore. I read about it. I see this, and it's disturbing to see some of the directions we're going, because it just doesn't make good sense.

You're kind of lucky to have had the time that you had.

You bet your life. See, I feel that we older guys saw the best of it. We did. And when you stop and think of all the things that happened in our lifetime, where we've gone, from what we had when we first were born, till with me in the last almost eighty years—what's happened.

You started out with the Depression, having jobs after school and on weekends.

Yes. You bet your life. And I'll tell you, that was the best teacher there was. You take these guys that went through the Depression, they took care of themselves when they were able to. You didn't see all these things that you see going today. You didn't have the crime that you have today. The people had more respect for others than they do today.

But who ever heard of the stuff going on in the schools? Why, now they've taken all the rights from the parents. You can't discipline your own kid! They throw you in jail, you know. Teachers can't do it!

So, that's all changed since the Depression era when you were working hard.

Sure. You bet your life. If I didn't behave myself at school, and my dad found out about it, I got a whipping when I got home. You don't go to school to mess up; you go to school to learn. That was drilled in your head. And the teacher had a right to spank you, if she wanted to. If she had a reason to do it.

You might get it double.

That's right, absolutely. That's exactly what happened. But now the law protects them. If they do something wrong, "Well, he's just a kid!"

But you feel like that was a good teacher for you?

Absolutely. Because when you earned a little bit, you took care of it, and you didn't waste anything, because you couldn't afford to waste it.

And that really paid off for you as a mine superintendent?

You bet it did. I think the old generation is always that way. They're all pretty much the same, because they had to. They were forced to do it. And they learned the hard way that you don't waste. You don't waste. I saw it even in the army, you know. There was an awful lot of waste. My God! A guy would get a muddy coat and throw it away, "Aw, I'll get a new one."

What else was it about the time that you worked in mining that you feel was like the best of mining?

Well, it's pretty hard to pinpoint any one thing. You didn't have all the regulations you have now. You didn't have all the paper work you do now. There's a lot of good things come out, you know. I mean, I don't say that all the things that have happened are bad. But the problem with what's happened is that the government seems to think that they can run everything better than you can. And that isn't so. You better be right there to see what's going on, in order to manage anything, I don't care what it is. See, you can't do it from Washington—tell somebody out here what to do.

Because when you were describing Carlin, you had very little contact with government agencies, at all, other than to cooperate on building roads.

Right. Well, our geologists worked with the USGS very closely. That's really the biggest place where the agencies came in. The USGS is probably one of the best branches of the government. I think they do an awful lot of good. Any time you go to one of those geologists, they'll help you all they possibly can.

In what way? In solving problems?

In solving geological problems. Anything you have as far as geology goes. In areas that you might want to look in, they have maps; they have all that sort of thing. They're very helpful. I don't think that we've ever had a problem with the USGS in all the time that I've been in the mining business.

Then, there was another branch that they eliminated—the Bureau of Mines. Now,

they eliminated that agency. The Bureau of Mines used to do an awful lot of testing and all that sort of stuff, that is no longer being done.

But again, that was to promote mining?

Promote mining, right. You could go to them, and, gosh, they had a testing place in Salt Lake where we ran all of our mill tests and everything else. But that's all gone now. Little by little, they chop at the mining industry to whittle it down to nothing. Believe you me, if this country has to depend on some foreign country to get everything, why, we're in sad shape.

JESUS MARTINEZ

VICTORIA FORD: *Today is December 5, 1997, and I'm here with Jesus Martinez in his home in Tonopah. We're going to be talking a little bit about his mining experience, but first of all, Jesus, I want to ask you some questions. You told me that you were born in Mexico. You were born what year?*

JESUS MARTINEZ: Yes. Twenty-eighth of May 1908, in the state of Jalisco. There's a small town they call the Union.

And what do you remember of Mexico when you lived there?

Well, you know, I was kind of small, and I didn't remember too many things. I was in a town, and I never went out of town. I was in the school. My daddy worked in the post office. He was well-educated. They said in the early days that he was planning to be a Catholic priest, but they didn't have enough money for him to go to college. He was planning to go to Guadalajara, which is the capital of the state of Jalisco. It's the second biggest city in Mexico. There was no money in those towns in those days. They were still

the poor people. They didn't have the chance to have a big education at the university. Just the rich people. So they started working here and there. My daddy was making a pretty good living, because he wrote a lot of paper-work all the time. It's a little different than now. See, in those days, you'd invite somebody to visit one of your kids by letter, and you had to ask a girl for marriage by letter, and then to the bishop of Guadalajara you had to write a speech, oh, a long speech, and you had to compose the speech yourself, out of your own mind.

The governor came to the small town to visit us, and my father had to compose in order to read the speech for them. He was pretty good for all of those things, and to make it a paper that was legal and to do all the red tape. See, in those days, still no progress. Maybe they got a typewriter in the courthouse, but outside, nobody had any typewriter. So it was all by hand, and they do pretty good with those.

As soon as they finished the papers, "Felix, I want you to sell the house," and they both went and signed—the people who sell the house and the people who buy it—and just take it to the courthouse and put a

stamp on it, and they say it's legal. See, especially, they knew my dad was pretty good, a really honest man, and they'd take him from one place to another, because in those days in Mexico very few people knew how to write and read. You know, the poor people. They even took him a lot of times to people who were in agony, just about ready to die. They'd go in and then pray for them, of course. They'd take him to the church to do a lot of the papers there, because they can speak in Latin or in Spanish, see. "What do you want? Do you want me to do this in Latin or in Spanish?"

And your father could do that in either Latin or Spanish, because he was that well educated?

Yes. This was a pretty good-sized church. You had about five or six priests there. My mother—I remember this—said, "Jesus, the whole time they give it to you. The bishop is going to come from Guadalajara, and he got you," because sometimes my father stayed up half the night typing. Well, he was speaking very, very good Spanish. Then my mother did say, "Geez! Why don't you give it to somebody else?"

Because it took so much time to write the speech?

Yes. In the nights, especially. He would work there in the day. I remember the bishop that came from Guadalajara, and when they were just coming into town, Julio, see, he got fresh flowers, and they'd go in the church. The bishop calls, and my dad got to say his speech there.

Did you go to school in a Catholic school?

No, it was a government school. They had a little Catholic school, too, but my dad

said the government school teaches more, because in a Catholic school, all they do is teach you how to write and read, but all mostly Catholic ideas and praise and things like that. In government, they won't teach you nothing like that. It's just writing and reading. Well, it was just a regular school. It's just the same as over here.

And so he thought you'd get a better education in a government school?

Yes, he did. Well, they tell you how to respect your dad and mom, and love your dad and mom, and even the old-timers. It was very nice, but they wouldn't go too far outside of that. In the government, they cared about our ideas.

You went until what grade?

In Mexico? Sixth. Well, see, in that time, there was the grade school.

And then what happened after sixth grade?

Well, I came over here.

You said that your mother didn't come with you to the United States. So what happened?

No, no. She passed away when I was about seven years old. I was very young, still little. Well, probably you've heard, there was this big influenza epidemic in Mexico and the United States. I remember a lot of things. This was 1916, 1917, something like that. In Mexico, especially in those days, there was not much medication, and there weren't any doctors, either. My wife was here in Texas, and she said a lot of people died over here in the United States. My wife was born in 1912, so she was little, but she remembered it, too.

You must have been very sad when your mother died. Do you remember it?

Oh, yes. If my mother had lived, I don't think I would have come to the States, because I was so close to her. But I remember everything.

Did you come to the United States by yourself, or did your dad come from Mexico?

No, I came with my sister and her husband. She was six or seven years older than I. Her husband came back and forth to the States, like the poor people that come to work and make a little money and go back to Mexico. One of the times, after they were married they came to the States, and they brought me, because I was next to my sister.

So she could take care of you, then, after your mom died?

Yes. I came as if I was their son. My brother-in-law was quite a bit older than my sister. They stayed about a year, maybe a couple of years, and they went back to Mexico. I stayed; I didn't want to go. I got out of the house, got a sweetheart. You grow up, and I liked it over here. I started working. I make a little money.

Did your dad stay in Mexico, then?

Yes. My dad died in 1954. I was working in Silver Peak then.

So then, how old were you when you decided to stay in the United States?

Oh, around thirteen, fourteen, something like that.

And who did you live with?

Well, partly I was by myself. I'd live a little over here and there, and we would rent a house with nice people. I stayed there, but I didn't go to school anymore. I worked in those crops—picked strawberries and oranges. I learned how, and I was pretty good. I like to work, anyway. When I was younger, I loved to work, and I've never been broke. I've always had at least a dollar to buy something to eat. In those days, for five cents, you could buy a loaf of bread—white or wheat.

So you made enough to support yourself?

Yes, and the people there were really nice people. They were from Mexico, too, and they had two girls, and I get along with everybody pretty good. I never had trouble with girls. In the mines we had a lot of foreigners. It's against the law to have one man work alone.

Yes, you always had to have a partner, right, in the mines?

I get along pretty good with everybody. A lot of them, they won't get along with anyone—fight each other for this and that. I didn't have that problem. I worked pretty good around the machines.

Let me ask you, how did you come from California to Tonopah?

Well, see, from California, I went to Arizona, and then I went to work for a while on the railroad. From there, I arrived in New Mexico. I got a few dollars, and we paid to get to Chicago—I and another guy. From there, we spread out, but by then I was a little bit older. I went to New York and lived three years in one town called North Tonawanda, near Buffalo, New York. See, the big river divides the town into North

Tonawanda and South Tonawanda. Even the big ships come through there from the Atlantic to the Pacific. I can say it probably was a couple of hundred feet wide, so it's big ships that pass through there.

Then from New York, did you come to Nevada?

Well, I wanted to go to Mexico, but then I changed my mind. Then I worked for a little while on the railroad, for the Santa Fe, and then I went to Kansas, where I got married.

Oh, that's where you met your wife, and she was from Texas, right?

Yes. We got married in 1928 or 1929.

And were you working there in Kansas when you got married?

Well, I worked on the railroad for a while. I never cared much for the railroad, so then I started to work on a farm—sugar beets and all of that.

Did you like that better?

Well, no, because my wife worked a lot on the sugar beets, and they got them in Oklahoma and Texas.

You both worked?

No, she wasn't working. After we got married, she didn't work with me. She was working when she was home with her folks.

I see. Then she worked as a young girl.

And she had a bunch of brothers. She still has her three brothers in Sacramento. One lived in Whittier, but died not too long ago. She was born in Texas, but her four brothers were born in Garden City, Kansas.

They were living with her, and there were two sisters, but one passed away a long time ago, way before my wife. Both of them were born in Texas.

Then we came to Wyoming. We lived in Whittier for a long time—well, eight years. From there, we came to Tonopah, because a friend of mine invited me to Nevada to work in the mines. I had never seen a mine in my life. [laughter] The farm is all right, if you owned a farm, but if you work for somebody else, of course, then you had a mission. And especially, that was the Depression time.

So it was hard to make a living.

Oh, yes, it was hard to make a living. I was never afraid to work at any place, no matter. In those days, I always played a little music. I always played violin and guitar, and we'd rent a saloon—the country club, they called it; it belonged to the Elks, and we went every week. Three guys, we paid for the rent, and we had a little money left. We made twelve, thirteen dollars, at least. Well, I guess in those days it was a lot of money. [laughter] Then on the farm I also played for my wife's birthday or my son or my daughter. Oh, we were pretty cheap, but still, we made a little money.

Yes. So you made some money playing music—on weekends or in the evenings?

Well, anytime, you see, because in the winter there was nothing there on the farm. Now, we came over here, and we played in Denton Station, and then we played in Goldfield and Beatty. I had one partner that played violin, but he was practically a professional next to us. He played in Reno in the casinos. I played guitar, and another played piano. We made a little money, at least, during the Depression, when all the people lived very poor. We worked in the fields. People that owned a farm—a young

farmer, say—well, at least he had a lot of animals, but people that worked for somebody, it was pretty hard.

So you came here, and you played some music, and you found out about mining, right? What was your first impression, if you'd never been in a mine before?

Well, I was with a guy that had been mining before, see, Jim Luna; he knew what to do. The family was here since 1933 or 1934, and they went back to Wyoming. Then, he invited me, because they were going to come back to Nevada, and he had been mining before. We were pretty good friends, so I started along. I picked it up pretty fast, because you have to know how to mine, and you have to know how to handle the powder, because it's dangerous. You can get killed pretty easy.

So what was the first job that they had you do?

Well, helping my partner drilling with his jackhammer. The sulfur irritated, and it was dry, too. Yes, I think we were using water already.

They were using water, so it wasn't dry drilling?

No, but it still made a lot of dust. I heard before, well, even when I came over here, there's a lot of people that died, the old miners. Even if they worked there four or five years, they died full of dust, because they drilled dry. I heard that under state law, they have to use the water to drill now—every company. When I started mining, I used the water. That all happened a long time ago. I worked twenty-seven years. Still, I got dust.

You've still got some. You still have some trouble breathing, do you?

Well, a little bit, but not real bad. See, I can pass. I worked in Mercury for three years, and then, we had to pass ten doctors' examinations to go in there. Oh, they were really strict. Some had been in the army, and they couldn't pass it there. They examined you with about ten doctors at least. One for your teeth, your knees, your stomach, and then your heart, and they made you breathe.

Your lungs?

Your lungs and everything. Oh, Christ, they do black pitch, and then you got to give blood. You have to be perfect. Sometimes, I see two or three guys that won't pass. They say they were just in the army, and there was no trouble. Now, "Well, I can't pass."

What did you do next? Did your partner, Jim Luna teach you about mining then?

Well, this guy was a friend of mine. We did the work with the muck stick. Mucking and the car. Then from there we pushed the car and dumped it in a chute. From there we had the railroad. You just get the car under the chute and open it, and they send it to Salt Lake City. Outside of Salt Lake, you got the biggest smelter right there. They call it the Silver City or something. Of course, that's for the ore, see, all the gold and the silver, and the rest of it, I guess, they throw it away.

Were you leasing at this time?

Yes.

And so you and a friend had to work together, right?

Yes, and sometimes I would lease by myself. I would do better, practically, when I was working by myself. Of course, I worked

maybe a little bit too hard. Just lucky. We had a doctor over here, Doctor Joy, and he passed away. He'd say, "I don't know how you do it. I never see any miners that live this long after putting so many years underground." He was a really nice doctor.

I'd say, "Well, Doctor, it's not my time yet."

And the doctor would say, "Huh!" [laughter] Everybody loved that doctor.

He thought you were very lucky, though?

Yes. Well, then one thing that would help me a little bit too, I never did smoke. Most of the miners smoked, and sometimes they got the air in their mouth. The dust you can't see from here to there, and they breathe the dust and then smoke on top of it. They won't live too long. I saw how the poor guy sounds. [Imitates heavy breathing, like silicosis in the lungs.]

You've seen them, how hard it is to catch their breath?

Yes, his lungs. Now me, especially at my age, I get a little bit short-winded, if I do something heavy, put that away or move around too much. I passed that examination over here in Mercury. We had an attorney over here—Bill Becko, I think, was this guy's name. He died thirty years ago, but for thirty years he was district attorney here, William Becko. The last three years he was a district judge. He had a bad back, but it had healed. He was a pretty strong man. He was quite a bit younger than I and was a really nice person. He pushed me to apply for the silicosis, see, because the miner that gets the dust, he gets some kind of a pension. Well, they were supposed to, but you have to quit the work too, see. I went there, and he was making me jump and this and that and checking my breathing. He said, "You know, you're still 86 percent." He said, "You're still in pretty good shape. Keep on working until you

die." [laughter] Well, see, then they had to be after them. Try and try and try until you get them, but they would always refuse to give you the pension.

Someone would say, "You got your pension, Jesus?"

I'd say, "No." They have to be there and go every day and beg to those people. I says, "To hell, I'd rather work."

So you never got your pension?

No.

Tell me about when you were leasing?

This one over here. Everything was pretty poor equipment. See, we had muck sticks, but then after they closed the mine over here, every other place has got a mucking machine.

What's a mucking stick? Is that a shovel?

Shovel, yes, and a mucking machine is just like a skip loader, just going like that, that deep and that wide.

It's got a shovel on the front, then?

Yes. They hook up a car on the back of the mucking machines, so when you muck it out, you muck it out with the car, too.

It fills the car right away.

Yes. It takes maybe a man to muck the car, one ton or two tons into the car, and I was already fast, too, on the mucking machine. I love it, because it's so easy. It's just like playing. Mucking by hand, that's quite a job. Mucking machines—they got a twelve size. It's not too big, but it still does it pretty fast, and they got another one, a twenty. It's a big dipper and big machine too—quite a bit bigger. We have to lay track, because both

things go on a track, and they're great. When you're going to raise, all the muck comes down, and you pick it up with the mucking machine. It's a lot faster. I love the mucking machine. It's dangerous, too. See, it goes like that, and they got two hands over here. As they are mucking, they go out and then down, and they toss it from here just to over here. If you aren't careful to move your head a little bit, it will cut your head off.

Oh, I see. So when the shovel goes under, it comes right beside you, and you have to move out of the way at just the right time, or it will get you.

Yes, and they go so fast at dumping and coming back to pick it up again. It's just the same with the skip loader. Only thing is, those mucking machines are a lot faster than skip loaders, and they're smaller, too. Of course, maybe the reason the engine is small is that you run it with air.

Not gasoline?

No. I put a year there in Bishop, too. It's a government mine in tungsten. When I went there first, there had to be electric motors in all the machines. Now they say they can use the fuel. They fixed something so that it won't bother the people, anymore.

So the exhaust won't bother you?

Yes. So there are other changes, but it's a government project. They got all gasoline or fuel machines, but I didn't muck there and use the mucking machine, because everything there belongs to a different union. It belongs to the operators of the union.

But now, were you in a union here in Tonopah?

Not over here. In Mercury I was. You had to belong to a union to work there.

Now, let's go back to Tonopah. When you first came here, what mines were you working in?

The Tonopah Mining Company.

And you were leasing, right?

Yes. Sometimes I'd work for somebody, like I worked for Jim Butler for a while, and I worked with Herman Woolman, who was a mine engineer, but he was a kind of rich guy and really nice person. Big guy, about seven feet tall.

Remember, you said that you worked in some of those mines that we looked at in these pictures?

Well, always here in Tonopah, I worked just in the Tonopah Mining Company, in the Mizpah Mine.

You said you drove a drift from the Mizpah?

Yes, to the Montana.

Tell me how that worked, how you did that.

Well, you just drive the drifts connected. This drift connected, the Mizpah Mine to the Montana. This guy, Herman Woolman, died a long time ago, too, but when I did the drift, I drove the drift until we connected to the Montana property, not to the shaft, because the shaft they had, maybe it would all cave in or something, but they wanted to connect the two mines and see if you could work there and bring the ore to the Tonopah Mining Company, send it to the Mizpah, but when we got there, we came out about five feet above.

The Montana was five feet below the Mizpah?

Yes. So Woolman said it takes a lot of work and a lot of money. See, they were all leased, and they wanted us to do some work, but he said the company won't go for that. They know there's going to be the same troubles, see.

So that idea didn't work out, because he thought it would be on the same level?

Well, I don't know. He was an engineer. I guess for the Montana, they can't go down; the shaft will cave in. They thought the guys were going to connect to the Montana. Maybe never been there, I guess. They thought they got it just to work in the Montana Mine and bring the ore to the Mizpah and keep it all in the same place, where we send the ore to Salt Lake City. Silvy is the name of our smelter, and that's the biggest smelter they got. They bring the ore from a lot of different places. After they pulled the railroad here, we sent it by trucks.

After there was no railroad?

Thirty-ton trucks—big, big trucks. It was a little more expensive too, but this whole way, they have to go from Tonopah to Mina and Hawthorne, and from there to someplace east to go to Silvy.

So you drove that drift, and that didn't work. They couldn't afford to get the ore from the Montana to the Mizpah.

No, we couldn't.

And you were working for Herman then?

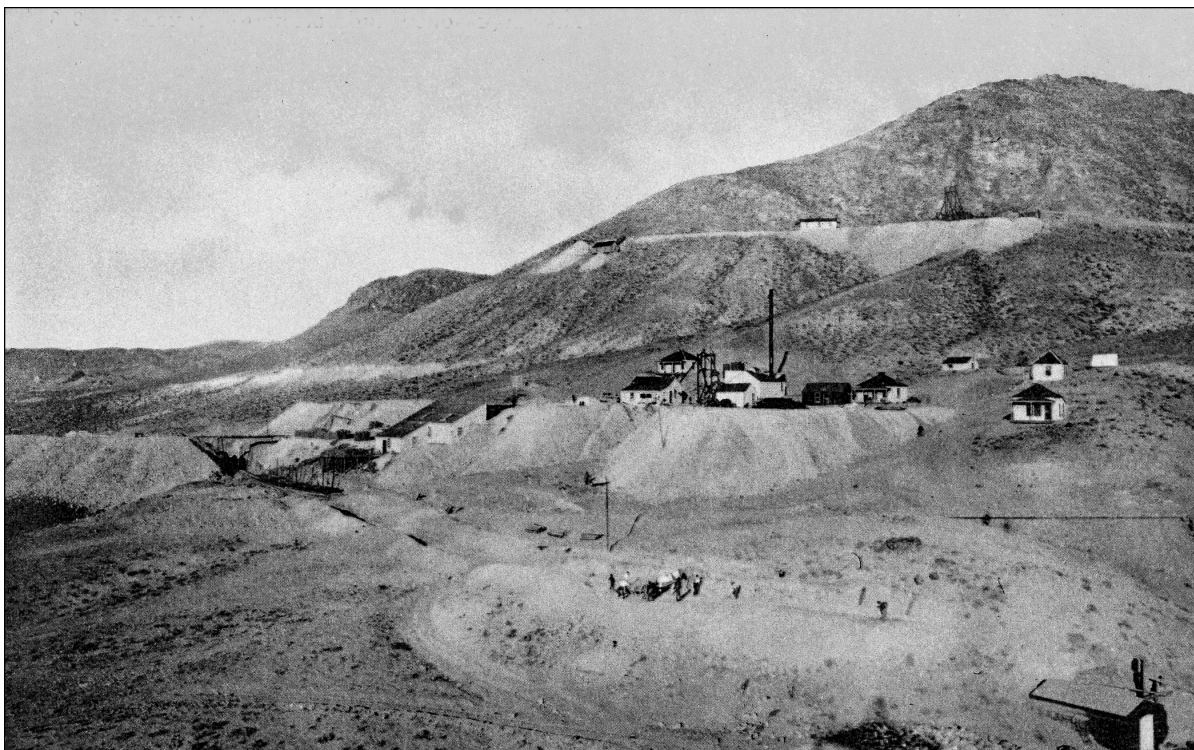
I was working for wages.

But you also worked as a leaser, is that right? You also leased?

Oh, of course. Yes, because a lot of guys worked just for a little bit. When I drove the



"I worked just in the Tonopah Mining Company, in the Mizpah Mine." The Mizpah Mine.



The Montana Mine

drift, I don't think it was more than three or four months. Well, I worked a little bit for Jim Butler, too, for wages, and then I went back to leasing for myself.

And how did you do on that? Did you make enough money to live?

Yes. I made better than wages when I would lease for myself. See, I bought a new car every two years, and I supported my family. We had six kids. For the kids, I helped as much as I could for their school. The oldest boy got in two and a half years of business school. The other got four years at college, and the youngest, well, he's got about thirteen years of college.

Oh, the youngest one, Jesse, who is a doctor?

Yes. See, you put in so many years until you graduate in Reno, and after he gradu-

ated, we sent him to Princeton, New Jersey, and then from there, they sent him for a while to London, England. That's when they sent him to represent the United States in a convention of the certificate doctors. That was just a big surprise to me. My wife would tease him and say, "How the hell did they send you off there, with you hardly talking?" Because he's kind of a quiet guy, see. "How the hell did you do when you got at the big meetings?" Of course, there are a lot of people.

He said, "Mother, when your son comes to represent the United States of America, you have to say something with a speech." The main thing they concentrate on now is cancer, and all the doctors give a different opinion, and he's in there with his ideas, you know, and he did pretty good.

My wife just teases him because the last day, there were two meetings. They said there was a big place, and there were all the doctors around him, and they went before

the Queen of England, and she said, "Goodbye. Good luck," and shook your hand.

"Shook hands with the Queen of England, Jesse?"

"Madre, well, I have to do it, because they are strict in manner. You have to shake hands with the Queen of England. Geez!" I tease him. He's a quiet guy.

He's a quiet guy, but he's accomplished a lot.

Yes, quiet, but he's a pretty smart young guy. I'm proud of that. Bill Becko said, "I've never seen someone who was born and raised in this town of Tonopah go that high in their education. You guys got to be proud."

So I said, "Well, sure I am."

He said, "All the family. As a matter of fact, the whole town, because we never had one person that got that kind of school education." Because it was the tops of education. He graduated in biology in Reno from UNR, and he did research in chemistry, and from here they sent him to Princeton, New Jersey. I've seen in a book that this is where Lincoln got his education, and Roosevelt and another president, too. Three that I saw in the book.

I'm thinking your father would be very proud of him, too, wouldn't he, because your dad liked education?

Yes, like Bill Becko said, "You guys are all family. You got to be proud."

I said, "Yes, we are pretty good." Of course, we sacrificed, too. I worked real hard to help as much as I could, and my wife worked a little bit, too. Everything we were making, almost, we gave it to him. He's pretty proud, because he told us two or three times, "If it wasn't for you and my mother, I wouldn't be in this position I am now."

So he appreciates your help.

Yes. OK, it's good enough to appreciate a little bit. Well, we tried with the guys, to give them the education, and the girls, they get mad. They say, "Geez, Manuel got four years college. John got two and a half, and Jesse, he got about twelve or thirteen years of college." They said, "You must feel proud."

I said, "Well, don't feel bad. Soon as you came out and graduated from high school, you got married. That's the way it is."

If they'd gone on to college, you would have helped them too?

Yes. College would help some, too. Just the one girl that went to San Francisco for a year. Another girl that's in Las Vegas that went to work, she's pretty smart, too, but they won't have much school—just the one, I think a year, a year and a half, but then got married. So then, out the door. Well, heck, it's not my responsibility.

You're on your own then, is that right?

Yes. Of course, the night we decided that, I ain't got no money but just my work, is all.

You said you worked in Tonopah. You also worked in Goldfield when you were mining, and in Silver Peak. Tell me, about how long were you in Tonopah mining?

Well, until 1965. That's when I quit the Mercury. I wasn't feeling too good. I saw the doctor one of the times, because I had to measure the blasting every half hour or hour. They have big fans that suck all the smoke out when you're blasting, but there's still gas, and I was too many years already underground, and then Doctor Joy gave me a good checkup and said, "You got dust in your lungs, and you have too many years underground. I've never seen any miner that lived this long."

I said, "Doctor, well, it's not my time yet. I have to wait for my time."

He said that all the time. He was kind of a quiet guy. “Ahhhh,” he said and smiled a little bit. [laughter]

But it started bothering me, the powder gas. So I’m thinking maybe that I don’t want to quit, because they pay pretty good money there, and then I said, “Well, maybe this is right.” Then I quit up there, and I said, “Well, I’m going to draw my unemployment for a while.”

Now I draw just a couple of checks. This doctor helped me, see, Doctor Joy. I said, “Doctor, tell me, because I applied for unemployment, and the guy said, ‘No, you quit, and it’s pretty hard to get.’” I said, “Well, I can’t work in the mines anymore, and that’s all I’ve been doing for the last twenty-seven years.”

The guy says, “Well, I don’t know. You have to get a paper or something, that the doctors will recommend you can’t work.”

I said, “I want to look for a job outside the mines.”

And I went to see Doctor Joy, and he said, “Sure, give me this paper.”

I got about two or three checks, and then I got a chance to work in the post office, and I put in fourteen years there.

You said something about the Belmont fire, before you went over to Silver Peak.

Yes. Well, in Belmont, I didn’t work. We worked for a few days. There was a guy, and I didn’t like the place, and I quit it. Of course, the Belmont burned in 1940. I was still working in the Tonopah Mining Company then. I went to work in the Mohawk at Silver Peak about 1949 or close to 1950. They closed up there in 1956, so I put in six years there.

You knew one of the men who was killed in the Mohawk?

All three. I knew them all—they were very good friends of mine. They were really nice guys, too, all three. I’m surprised I have

forgotten their names, but we knew each other pretty well. They had a wife and a kid in Mina, and they were looking for a job over here with me and said, “I know you, and I see you come over here.”

I said, “Well, wait a couple or three days.”

I got one, Eddie Russell—he lives in Carson—and he says, “Jesus, I want to quit.”

And I said, “Well?”

He says, “I want you to do me a favor.”

I said, “What favor?”

“You know, I want to draw my unemployment, but you have to give me a slip that you laid me off. The other way, I have a hell of a time.” I know, to get unemployment is very hard. He said, “Well, you give me a little piece of paper. You’re the foreman, and I guarantee you, if you help me.”

I said, “Sure, I’ll give you a piece of paper.”

I explained, “I laid these men off, because right now I got too many people. I can’t keep them all right now, but he’ll be back in a very short time.”

They showed it to the unemployment, no trouble. They said, “I just showed that little piece of paper to the foreman, and well, they laid me off, because they don’t need me right now, but later, maybe they will call me back to work.”

But the same day they those three guys asked me for a job—the three guys I knew. They were all friends. Chief was a big Indian guy. Swede was all freckles and a young guy, too. very blond. Maybe, he came from Switzerland? Pretty nice guy. And the one that asked me for a job was a little, Spanish, short guy, and he said, “I need the money.”

So I said, “Well, why don’t you wait a couple of days, and I’ll put you to work.”

About that time this guy said, “I’m going to quit on payday,” because it was two or three days before payday.

And I said, “OK. OK.” So I told these guys, because I have to hire somebody. They have to have orders from the superintendent or the owner, so I wrote a short letter to the

city, because there wasn't a main unemployment office there. "I laid off Eddie Russell because I don't need him right now." See, I told these guys that I wanted to write it, because sometimes they come from Carson, the main office, to see why they laid off this guy or something, because they don't want them to draw unemployment. They don't want to pay unemployment unless they really have to.

So I told this guy, "In case something happens, you better not mention a thing, because I will get in trouble myself."

"No," he said, "No. Christ, no way."

I just took out a little piece of paper and said, "You're going to go to the main office."

Jim Wayne, he was bookkeeping there. He said, "Well, it's all right, if you don't need him."

And I didn't tell the secretary. I just told him, "I laid him off, because I don't need him."

"No?"

See, the same day that he called me, he went out to the mine where I was working. Of course, I was shifter. I just went outside and inside to check everybody. This one asked me for a job because he knew me, and I said, "Wait a couple of days," and, well, I guess they got to try something. I don't even know if he had a car or not, but they went up there to the Mohawk. In the same day, they went up there to Silver Peak, and they needed somebody to go on the graveyard shift. That same night they got killed—those three guys. That's too bad, but what can you do?

Were you asked to help get them out?

Oh, yes. The main boss up there, Sam Levine, said, "Jesus, you better come. You know the mine. You've been working the mines for six years, so you know the mine pretty well."

I said, "Yeah, I know the mine pretty well." See, it had been already two years that they hadn't kept me working. By now they have a lot of ore working and are quite a bit bigger. It's different altogether. I said, "Well."

James goes, "You're the boss."

I got eighteen men over here in Tonopah that came to the call. I told everybody, "Well, let's go." I got a pick-up, and I took a bunch of guys, and some were in their own cars. We got there a little before noon. There were already people—photographer guys there to get pictures and people from L.A., from all over California and Ely and Elko and all the mining camps.

All the mining camps sent people to help?

Yes, to help them, and they all brought their lumber. You have to have lumber to go in, and so many bosses, too, because there were superintendents from a lot of different mines and one or two doctors. Too many bosses there. Christ, there were big shots, and the mining inspector, Gallagher, was there. Everybody said, "Well, let's go look this way."

"Let's go this other way."

And now, "This other way, because somebody's going to get hurt."

I told one of the bosses there, "Trainer," I said, "You know, this is a mine inspector." I said, "Tell Sam Levine I want to talk to him. Can we go home? Because there is nothing I can do." Christ, it was six o'clock, and still nobody was doing nothing. Just talks, and the drift was full of people and photographer guys to get pictures and, oh, newspaper guys. Well, nobody started to do anything, and I said, "I got a little bit, I guess, for these guys that came here." See, they were sunk a little bit, they say about ten or twelve feet down the incline, and then they wanted to go on, and it's so far. They said they need a lot of timber. Another one

wanted to go in the hole, what they called this “solid ground.” Kind of odd. They still have to close the cave right about eighty or ninety feet, and that’s where these guys were sinking there. So I said, “Well, we’ll never get these guys.” I came back, and still they haven’t started working, and now I came back and they started working. By law, they still had to work thirteen days to get them out. It’s by government law. They say that in certain places, if a person is in really good shape, he can live nine days. That’s the tops. They have to be in really good shape. That company lost a lot of money there, and then they gave up. They didn’t get them out.

I knew they never were going to get those guys out alive, because I made a hole myself in the drift on level two. I told Ernie Shirley, “Ernie, the wind is too cold over here. Let me make a big door for the drift.” The drift was about this wide. See, I was driving the drift, and we hit the vein.

About eighteen inches or so?

Something like that, yes, and then just a few feet ahead, there were big lanes. They called them lanes in the mines—these big, big ore bodies that were eighty or ninety feet wide, and good ore, too. They wanted to put in the timber, and I predicted it. I was the mine foreman. I was just working. There were no shifters. I said, “Ernie, you guys got too much ore work here. Too much is rock.”

He said, “We need the ore for the mill.”

I said, “Yes, but they won’t put in any timber. This is going to cave in some day and drop, and they’re going to just ruin everything.”

Well, he said that the boss needed a lot more rock to keep the mill going, and then they put me over here to work in the same outfit, in this Tonopah team, and that’s when I had eighteen men over here, and this is when the cave caved in.

And that was Ernie Shirley you were talking to about trying to get timbers in there, because you could tell it would cave in?

That’s what I told him, see, because the people were born and raised in Silver Peak. There were two brothers, Ernie and Louie Shirley, who are both dead now, and both were really nice people. I said, “Well, they don’t know much.” They never worked on a mine outside of Silver Peak, because in the early days, their dad owned that mine, but there wasn’t much until they hit this ore body. They were drilling just to do some prospecting, and they hit the big ore body, and two, three, four, or five—lot of mills. Tons are ore coming out of there, but they don’t get up there. See, they have to put square sets. I explained that, because I’d been working a lot of mines when I was younger. I saw square sets in Goldfield. There, they just opened it. They just kept on going without anything.

Without any support?

Yes.

Did they leave pillars of ore?

No. That’s the trouble. That’s what I told them, “Why don’t you leave a pillar or put a set over here, a real heavy set and fill her up with dirt?” Because we were close to the surface, not too far, maybe about 80 feet from the surface, so they could drill a raise clear to the surface, and they could get the Cat there and a lot of dirt and fill up the square sets. But no, they wouldn’t do anything. Well, they don’t know much about the mine. So then, it happened exactly the way I was telling.

The way you expected. So you knew they couldn’t get them out of there, either, the way it caved in?

No, I went because I was getting paid, anyway. I mean, I got pretty good wages. I was shifter for about two years.

Yes. You said that you were a shifter or shifted? Is that shift boss?

Yes, foreman. They call it two ways, shifter or foreman, but a foreman is supposed to be a little bit higher, and shifter, well, it's putting in the same job. This outfit was from Silver Peak. The owner there, Avery Brundage, was a big millionaire from Chicago and probably a president of the Olympic games. He was a really nice man.

You worked for him?

Yes. We would talk a lot of times. He said, "Well, I lost me about eight or ten million in the operation over here."

I said, "Well, Mr. Brundage, I knew you were going to lose money," because some of the guys, like George Holmes, came from Coeur d'Alene, Idaho. He was a superintendent there of one mill, and they told him they got millions of tons there, and they'll build a mill there. Brundage didn't know how much ore they had, because everybody told him, "Oh, you got ore over here for ten years for sure."

And he asked me, "What do you think?"

I said, "Well, Mr. Brundage, this is your business, but no, I don't know what's inside. How the hell do they know that they got that many miles? They have how many tons? There has to be millions of tons to keep the mill," because it was a big mill, too, and first class.

I guess Brundage owned millions in Chicago. In the middle of the city of Chicago, they got one restaurant, and all of these business people are in the square. Can you imagine how much money they are worth? Jesus Christ. And he was the president of the Olympic games—he said that he

wouldn't get paid; he was just a volunteer. He was one of the top football players, and he was big man.

He was famous for his sport, yes.

I said, "Well, where did you get the idea to come and mine in Nevada?"

He said, "Well, I saw it in the paper. I had to do something." I guess he wanted to spend some money. He said, "Well, I lost quite a bit of money over here." He told me about eight or ten million, and he said, "I lost over here, but I still got a little money left."

They look like they don't care. He had no family. His wife divorced him, and they don't have kids, and she passed away. Anyway, that's why he was here. He was a pretty good white guy. You got to see when he climbed the ladder that, Christ, he was a heavy, heavy guy, probably 250 pounds or something, and he climbed just like nothing, but he was a football player in his young life. They can do all kind of heavy exercise.

I said, "Well, I don't know, Mr. Brundage. George Holmes, I think he lied to you," because you can't say, especially never having done any diamond drilling. You know, sometimes when they got an ore body, they put in a diamond drill to bust it, and they get the dirt and the sample. And they would do nothing, and these guys make him believe they got ore for ten years. I said, "I don't know, but I won't believe it. I can't say yes or no, but it's not right to tell you this."

He says, "Well."

So they keep on going. It didn't last too long, the ore. About another year, and they ran out of ore. And the ore where these guys are, its a big ore body, looks just like that.

Just a circle, and that was it?

Yes. Just a big, big ore body, and, as a matter of fact, I went up there, because I

drove the drift. It was before they moved me over here, because they closed up, and they started again. Different people have worked there, but right now, it's closed. I drove a drift underneath, and this guy, Ray Hardy, from Couer d'Alene, worked for Sunshine, and the Sunshine, they were going to buy that place. They got a lease with an option to buy, and they told me, because it was pretty gassy, "Jesus, do you want to drive the drift eight hundred feet?" The engineer had figured where the ore was, and they thought that it was eight hundred feet. If the ore goes down that far, there's a lot of ore, a lot of tonnage there. At Sunshine they drive the drift, and if the ore body would go that much farther down, well, they would know if they had millions of tons there. But no, I drive the drift there.

And did it go down that far?

No, no. It was just there on top. I hit the vein, and I think it was around ten dollars, twelve dollars. It would be worth more to get it out. No, there was just the ore body; there was just the one big "lancer,"—that's what they call a big chunk of ore. Farther down, there was no ore body. I hit the vein when they stopped. Where do we go from now on? It was very low grade, too.

That's when he quit. In the Sunshine that's all there was, waiting. They went down there with Hardy. Ray Hardy was a colonel in the war, and they were really nice. They wanted me to go to Couer d'Alene to get the mines out there, but they told me, "You're crazy," because Ray Hardy would really give me a good job and good wages.

I said, "Well, I don't know."

Some guys here were from the mine, and they said, "Some guy buried some fifteen hundred, two thousand feet deep. You got to see, hot as an oven."

So you got good men to listen, instead of splitting. I said, "No, I won't go. I have to

stay here, and I got my family. I'd have to move up there and all of that. No."

But it was pretty nice. I'll tell you, these people are rich. The Sunshine Mining Company is the biggest in the United States, just about. The superintendent was boss of the mine for years. They have packing houses in Seattle, Washington, and he sent me three or four pounds of salmon. When they quit over here, when they closed, I even helped pull the tools and everything, and they gave me \$400.

Oh, a bonus for helping to close this mine?

Yes, he was a really nice guy. This was Ray Hardy. He was colonel in the war, and he said he was in the Missouri ship when Japan surrendered. He told me the story. One time he talked about "the glory days."

Two guys came from Texas, and they said, "Ray, you so-and-so," and they were going to beat him up, but he hurried and locked up in a car, because he had seen them. The big shots dancing with girls and champagne and all this. Sometimes, before Japan surrendered, Christ, there was a day or two, with nothing to eat, and there was rain. They say there's the glory days of the war.

Now, you were explaining to me that you worked in the Mizpah and the Silver Top here in Tonopah, and that was nine years for the Tonopah Mining Company?

Yes, I worked more than nine years. I didn't count the three years I put in at the Tonopah King. It belonged to the same man, a guy from Silver Peak named Brundage. Well, really, it belonged to a different company, Heckle and Cattleman, a mine from Arizona or some place, and this guy got a lease with option to buy the Tonopah King, and that's where I shifted two years. I had eighteen men, and I was leasing myself first with Pat Chiatovich, but he's dead, too.

Oh, you worked with Pat? I know him, because I did a lot of interviewing with people over in Silver Peak, so I know the Chiatoviches, yes, Stanley and Pat.

See, it was a big family—not too big. There was Marco, Jack, and Pat, and Bill. There were four brothers, and the old man, Martin Chiatovich. Pat was my partner in Silver Peak for four years. We worked a long time. Pretty nice guy. We got along pretty good, and we made a little money, too.

They had to do all the drilling and mining; it was good work, but they didn't care about the low cut. If you drill or work somewhere on the face like that, you have to guess it yourself and figure out how the holes can break the ground, because the other way, the powder just comes out.

How to set them in there so that it will break the ground away?

Yes. You have to set them so the "cuts"—we called the low ones cuts—set a certain angle so they pull the ground this way, and there are ones that just break it easy, but if they don't know how to put the cuts, they probably just come out, and they won't break any ground.

And so you did most of that work?

Well, I know I'm pretty good, and Pat would say, "You're really good, you know."

He trusted you to do it.

Yes. "If you want me to help you, just tell me where the holes go," and this and that. But he was a really nice guy, a good worker, and he never got mad. I told him sometimes, "Pat, don't do it that way."

And he'd say, "OK." [laughter] We got along pretty good, and we made pretty good money there in Silver Peak. One year—I kept track—we made about thirty-four dol-

lars a shift, but in those days we were getting just twelve dollars. He said that he'd raise us to fourteen dollar wages, the base-pay, and we were making thirty-three and something, that I kept track of one year. It was a cheap ore contract. We got so much a pound, and we made pretty good money.

You said you worked over in Goldfield for four years. What did you do there?

Well, drilling, too, just driving drift and raises.

You were in the Florence shaft there?

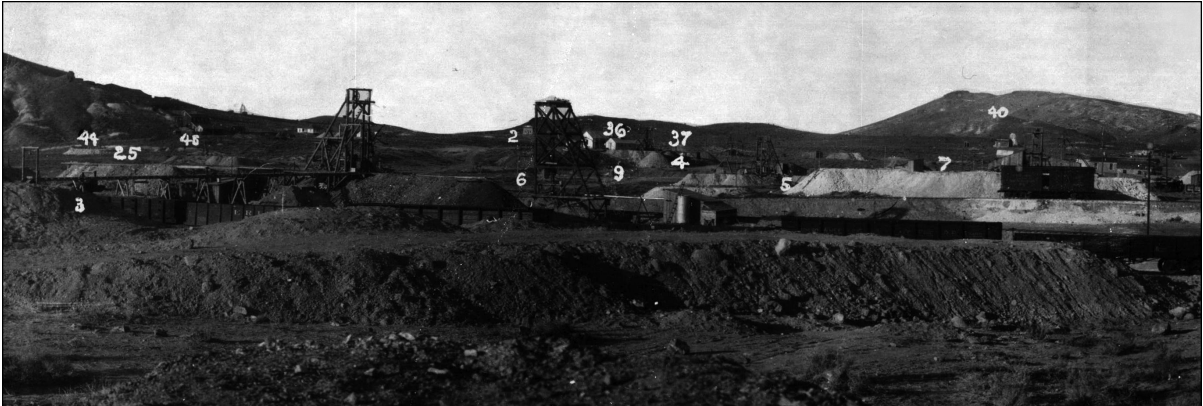
Yes, Florence shaft. They connect to the Whitecaps, too. I worked a little bit in that area, but not too much. Most of the work, I was on the Florence.

So you've pretty well covered all of this territory, then—Goldfield and Silver Peak and Tonopah.

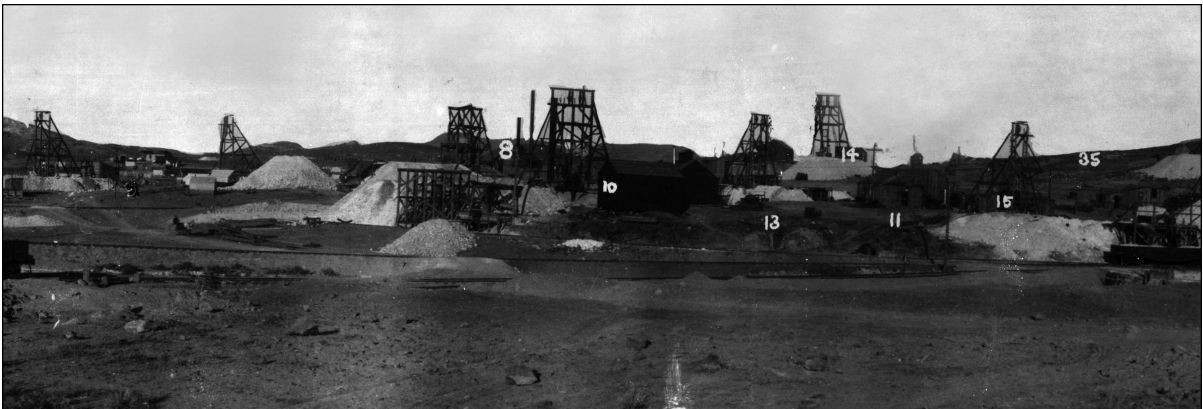
Yes. Of course, those were the only mines that were open when I came over here. There were probably thirty mines, companies, and this and that. So many shafts had all caved in already. When silver went down to twenty-six cents during the Depression, during Hoover's administration, then the companies couldn't make it. Labor was very cheap, too. We still were paid five dollars a shift, but silver was very low, twenty-six cents, and that's when the companies almost stopped all operation in this area of Goldfield and Tonopah.

The Victor—you see the big mine there on the side of the Sun Downer Motel? They call it the Victor. It was a big, big company, but I didn't work there.

But that's when the price of silver went down. That's when you had to kind of look around at some other places for jobs.



Panoramic picture of Tonopah, Nevada. 44-El Caney Mine; 3-Sheetish Lerseon Combination Mine; 25-de Costa Mine; 46-Kin Kead Mine; 2-Transformer Station; 6-Mohawk Mine; 36-Kewana Mine; 9-Mohawk Consolidated; 37-Laguna Mine; 4-Red Top Mine; 5-Bradbury Lease; 7-Kalfus Lease; 40-Lone Star Mine.



8-Oddie Lease; 10-Mackenzie Lease; 13-Hayes and Monnette Lease; 14-Mohawk; 11-Hayes and Monnette Lease; 15-Truett Lease; 35-St. Ives Mine.



16-Frances Mohawk Lease; 31-Jumbo Mine; 17-Curtis Brother's Lease; 19-Loftus Davis; 12-Oddie Lease; 18-Oddie Lease; 20-Combination Fraction L & M Co.; 33-Atlanta Mine; 38-Third Chance Mine; 39-C.O.D. Mine; 34-Gold Bar Mine; 41-Victor Mine; 21-Burns Lease; 42-Yellow Tiger Mine; 22-Combination Fraction; 23-Florence Mine; 26-Florence Leasing Mine Co.; 47-Pallard Lease; 43-Portland Mine.

Yes. They have to have a lot more ore and better values, so they make it pay to get the ore out. Over here in that time they had one mill and millers, and one over by the foundry, and they had another one at the Belmont on the other side.

So they had three mills going?

Yes. That's what I heard.

That was before you came, right?

Yes. But when this Depression hit, and the silver went down, all the mines quit. They couldn't make it pay. The Tonopah Mine, and the Belmont they kept open to the leasers. I think you could make a little money, because they got percentage. They

wouldn't lose anything. People that leased made money. Well, no matter how much you made, you got percentage.

I see. So when the prices went down, you went to leasing.

Yes. Well, I came way out there, see. We were leasing a bunch of leases.

There was already leasing when you came here?

Oh, yes, I heard they closed it in 1930, the big companies, and I came in 1937, so they were leasing, a bunch of men over here, and I came along with this guy, a friend of mine. I said, "I'm going to try by myself." I leased, and I did pretty good. Never made



The Belmont Mine. *"And the Belmont they kept open to the leasers. I think you could make a little money, because they got percentage. They wouldn't lose anything."*

the big money. Some of them find a chunk of ore, a bunch of ore the company left, or they don't know what's inside, and some of them made a pretty good chunk of money. Jim Butler—this is where he got rich. He bought a good ranch, and he was a millionaire when he died. They have one stope there they called the Mizpah Mine or Mizpah Grade, and they found a big chunk of ore. They had two or three men there, and they got a lot of good ore.

I'm going to ask you something on a different subject. Were there any other families from Mexico here when you came to Tonopah?

Well, the only people that I know is the people I came with. They were all from Mexico, just the old-timers like Julio Luna, and they had a bunch of family. Wanda was my age. The old man died way before, and all the rest of them were born over here and were young ones.

OK. So that was the only family from Mexico, was the Luna family?

Well, there were some others, but they have all died already. Raymond Morales was over here, too. He was from Mexico, but he died not too long after I came out here. He was full of dust. Another three or four guys came from Mexico, all dead now. They worked in the mines when they were drill-

ing dry. Full of dust, you know, the poor people.

Yes. That's too bad.

Yes. I worked with one guy, Dick Boney from England, and he says he never worked outside the mines. Even in England, he said he worked a little bit. He said, "I want to work on a farm."

Some guy said, "Oh, Christ, just go work in the mine," because I guess they had a mine in England. "You work in a mine; they pay you better wages than the farm."

He said, "I never do nothing else, but work in the mines," and then he died, but not in the war. He said that during the First World War, he went into the army for the United States. He had come over when he was a very young man yet. He asked me, and I felt sorry. "I can work with you?" They were working for Jim Butler, and I worked a little while for Jim Butler. That's the only guy who had money to pay cash.

I said, "Oh, Dick, let me do the work, handle the machines." By then, I knew a little bit about machines, but before that, just a little bit of exertion and . . . [Sound of heavy breathing, indicating silicosis in the lungs]. I was afraid he was going to pass out. He died not very long after. They said he worked in Virginia City. Pretty nice guy.

OK, I think that's all the questions I have. Thank you.

BILL AND BLANCHE SHIPLEY

VICTORIA FORD: *Today is March 5, 1999. I'm here in Gardnerville with Bill and Blanche Shipley, and we're going to be talking about the Monarch Mine. Bill, would you tell me where you were born and raised?*

BILL SHIPLEY: I was born in Idaho and raised on a horse ranch at King Hill. That's down in the southern part of the state on the Snake River.

Did you get involved in ranching as a kid? Did you have to work on the ranch?

No, but I got to ride a horse. I wasn't there too long. When we left the ranch back in the 1930s, why, Dad could have horses and cattle and hay and everything, but he couldn't get ahold of any money, and he lost the ranch because he couldn't pay the taxes on it. That was what happened in the 1930s, and I think it's coming again, too, and this will make the 1930s look like a picnic.

You think so? With the stock market going the way it is?

You bet your boots. Stock market, everything. See, Dad had money in the banks, but when they closed them bank doors, you was broke. You couldn't get a damn penny for nothing.

So you lost the ranch, and then what happened?

Well, they moved to town. He took a team of horses with him, and he worked for the county in Gooding, Idaho, with an old belly-dump, gravel-hauling deal in them days—for hauling gravel on the roads. We moved to Emmett, Idaho, and my brothers all went to mining, because the mining was breaking open a little bit.

How many brothers did you have?

Let's see, I got to count them up—five brothers and one sister. [laughter]

Were the brothers older than you?

Yes, all but one. I got a little brother that's younger than me. There was four years between every one of us.



Blanche and Bill Shipley

So, the older brothers were heading off to go mining. How old were you then?

Well, I was up there working, hand steeling, about the time they left. They were all older, and they'd been mining before. I went to work with a fellow by the name of Martin Hayworth. I was nine years old. I was starting to steel for him, and he'd let me lace powder and get it ready. He'd load the holes. He wouldn't let me spit the round, but he'd send me down the drift about 158 feet. He'd light the round, and then we'd walk on out and just stand out there and count them as they'd go off. If one of the lifters missed, and you drilled into it, you were going to go out the door by yourself, you know.

You've got to make sure each one goes off. You've just said several terms that I haven't

heard before. Maybe you can tell me what they mean. You said, "lace the powder," and "spit the round."

Well, when you lace powder you put your cap on the primer, on the fuse. You punch a hole through there with a stick two ways, and then one straight down the stick of powder, and you lace through that, so that if it gets hung up in there, you can pull it back out and reach in there and get a rock out or something. That's with your spoon. I told you about the spoon? They load them all in first. They go in, right in the bottom of the holes, and you put the rest of your powder behind them. It depends on how many sticks you're using to a round. You load them right to the collar. Other times, maybe you put a stick and a half or two sticks in. It depends on your ground.

And the spoon, tell me again, that's used to load it? Or that's used if you have to get it out if it doesn't fire?

Well, if something doesn't go off, then you start looking for it, see, because you can usually find it in the muck pile and get it pulled out. Or, if it didn't, then you've got to look for one of them lifters that didn't go off, because most of the rest of them will go. Usually, when you're drilling your lifters, they're down and sometimes underwater.

Because lifters are the lowest row of holes?

That's the lowest. You have a muck sheet that sits right in front of them—iron muck sheet. When the lifters go off it pulls everything back, sets it on that muck sheet, and you go in there and shovel her up real fast. That's a hunk of iron about, oh, three-eighths thick, or maybe only a quarter. It depends on what size drift you're running, but it's about four by six or eight feet. You lay that right down there on the sill, and when that goes, the lifters lift up a pile of muck and drop it on that muck sheet, so you can muck it out without trying to muck it up off the rough, rocky floor or sill. That drift I was telling you about, I ran up there in fifteen days. I had to put newspaper in the back end of them to keep them from mushing the powder back out. There was water coming out of the hole, so you didn't get the jackhammer giggles, because you had plenty of water in there.

And the jackhammer giggles are what?

That's silicosis. It's what they'd get when the old fellows used to drill dry.

When you started, were they still drilling dry?

No. They had water.

So your first job as a nine-year-old kid was holding the steel?

Yes, turning steel. See, you have the starter and the second and the third. We were pulling about a four-foot round. Every time he hits it, you turn it a little bit. Just as fast as he can swing that double jack, why, you turn that a little notch. When you get full, then you take your spoon and clean it out, and then you go some more. Then if you get in some pretty broken up ground, why, you can drive that bull prick in there and take your auger and auger that back out. That saves a lot of hammering and pounding.

A bull prick is what?

It's a long piece of steel, say, a four-foot piece. It's kind of blunt, to a point, and you swell that.

So it's curved a little bit?

So it's kind of like that. You can drive this into that rock. See, the rock is in here, and you drive that in there, and it'll break this rock all up, and then you run this auger in. An auger has an end on it, and you throw that end out—just like a drill bit. That will break the rock up and bring it back to here. Then you can take your spoon. It's a piece of three-eighths rod or something. You flatten it out until it's about an inch wide, and then you bring the spoon back like this. You put a short point on this end. So if you get some rocks in there, you take that short point in there and pull it out. This is concave. Put that in there and turn it.

Just like a spoon with a hook on it.

Yes, but you pull it back out. It will be full of dirt, and you can dump it, see, get it out of the hole.

And the auger has kind of a spiral?

Yes. It's a spiral, just like a big wood drill, only it's made out of a piece of hand steel. Back here you got a handle in it, like this. When you make one, you always turn it to the left, if you're right handed, because then when you go to mining, you're usually turning right handed. You turn your deals backwards to bring your stuff out. Then, when you get to use your auger, you can turn it right handed to get in there.

Your hand steel is built just like this. This is the end here that you pound on, and it gets all rounded off. This is your gauge down here. That's the bit on it, right there. You sharpen this much of it. When you go to temper any one of these, you get it hot and dip it in water or oil. You bring your heat back about two inches. You dip it in that oil or water or whatever you are using for tempering, and you watch it. You'll see the straw—it's yellow—coming out towards the end of it. Just as it gets to where your bubble is on your steel, you dip it in there and leave it. That let's the heat come out so it won't break back behind. You just dip it in about so far, just enough to kill that heat—right there where you want it. That makes this just as hard as a piece of steel can get. You got to get that straw just before it gets out to the tip of the deal, because if it gets out there, it jumps, and you lose it. Then you got to heat it again and get that straw back out there. If you cut your heat back too far, then you'll break your bit off.

How did you learn all this? Did you have to do all of these jobs at some point along the way?

Oh, yes. That's right. When I was driving drifts up there, that one time, I did all that myself. Old man Hayworth is the one that showed me how to temper steel and sharpen picks. Picks—same way—when you take

your pick, you got to temper it, too. You catch that straw right out there about a quarter of an inch from the end. You can use that pick for a long time, and when it wears down through there, then you have to take it out and sharpen it again, because it's just getting too blunt. That's real hard then. You can catch that just right. If you don't watch that, it will jump off of there, and then you have to heat it and do it again. If you don't catch that straw, they are too soft, and then they either bend or flatten out or something.

Now, you've mentioned that there were certain important tools for you to take in. Have you just drawn all of those on that sheet of paper?

Well, you still have a shovel to go in there, and sometimes, if you have a muck sheet in there, why, you use a square point. This is a round point. Usually, they had a handle back here like this, because you didn't have room for a long handle in some of the small drifts. The other one was a square point shovel like this. If you were on a muck sheet, that's what you wanted to use, because you could shovel faster with it. Probably, most of the time you'd have them both, because when you'd go cleaning out a water ditch, why, this round one is the one you'd want to use.

But on the steel plate, the square one would clean it off?

It's flat, see, just as flat as this table, and you can run a square point under that. If you run a round, see, this is concaved, and you go to shove it under, and it's hanging on rocks all along the edges.

Did you take a cart in?

Ore car or a wheelbarrow. An ore car is just a deal like that with a set of wheels on it.

Just a square with wheels. How much did it hold?

Most of them about one ton, and they go up to ten ton. In some of the big mines, hell, they have bigger ones now. I don't know what they're using anymore, but the one ton is what we used in mines, mostly, the little mines.

Let's go back. I'm really curious about this, because it sounds like during the Depression kids had to work—at least in your family—in order for everybody to have enough money.

Everybody worked, if they could find something to work at.

Were you interested in mining? Is that how you got started?

Well, that's where I got interested in mining.

You got interested by experience?

Oh, yes. We ran that drift that summer. In 1952 when we were in Colorado prospecting for uranium we found a *Life* magazine. Right there on the front page, there's a picture of this old Tramp Mine at Haley, Idaho. I got to reading about it, since we'd been in there, and they had a map of the mine. Somebody went in and leased that, ran a twelve-foot crosscut, and hit the biggest body of ore that ever came out of there—out of the drift that drove through those hand steels. But we missed it. We were following a little stringer like that through there, and they figured that was going to open up into something. It was about four inches wide.

So, later you heard what happened to that mine?

That made me a firm believer in crosscuts. [laughter]

Go every direction, and see what you can find.

Sure, because if you have one vein of ore running through there, chances are you have some more on both sides of you, because it's pretty hard to tell where they're at. When you run a crosscut you're looking for something, and sometimes you can hit it.

When I was a mine foreman in the Bohemian Mine in Oregon, the old timers went in there and had a drift in. Somebody got the idea that there might be something on the left hand side of that drift going in, so they pulled about an eight-foot round out of there. They hit a body of ore that was just damn-near pure gold. They took out three hundred and some thousand dollars when it was about nineteen, twenty dollars an ounce. So I always believed in crosscuts.

I'm curious about when you were nine years old. Do you remember that real clearly?

Oh, yes. Definitely, yes.

What was it like that first day you went there with Martin? Do you remember that?

Didn't bother me a bit, because, before he'd start letting me go in there, I used to take carbide light and go back in there by myself. I went back in there while he was working two or three times before he decided to let me come in and help him.

How far underground was he? Or was it in a tunnel?

It was a tunnel.

Going in sideways into the hill?

A drift they call it. Probably in there, near as I can remember, about 500 feet.

And you'd been back in there to find him on your own?

Yes. In there about 150 feet was a stope where somebody had stoped out from the top down, I guess, because there were never workings underneath this. A railroad track ran across there. Evidently, they'd hit some gas in there, because every time you'd get to where this air was circulating around in there, or not circulating, it would put your carbide light out. One time I was going out there, and the tracks and timber must have been eight feet across it. I was coming out of there, and my light went out. I didn't have any matches, and there wasn't any flint in the light, so I got down on my hands and knees and crawled that two by twelve in the middle of the tracks with a hand on each side of the rail until I could see that pin point up there and get up and walk, because then I knew I was past that place in there.

Because there were no other lights in there? Just your carbide light?

Carbide, that's all you had.

The carbides were important not only for light, but they told you whether the air was good.

Yes. If you get in any kind of gas, why, carbide light won't burn. It'll go out. And when they go out you better get the hell out quick. That's what killed them in Virginia City a year ago. See, they went through some of that black damp gas. It lays down on the floor, and when you walk through it, you stir it up. They made it in all right, but when they came back out, here it was up in the drift, and it nailed them.

So you got timber gas, you got black damp, and God only knows how many more.

See, there's no circulation when you're down in there deep. In fact, I worked in a stope in Park City, Utah, the old Judge Mine. Three guys died in it. Two guys were gyping down there; they were contracting. The more ground you break, the more money you make. They went down, and their carbide lights wouldn't burn, so one of them went back and put up electric lights. That's a dumb thing to do. When they didn't show up to catch a skip going up, or the cage, the shifter went down to see what the hell was the matter. He got down there, but he didn't come back. So they sent the rescue crew down, and they pulled all three of them out. Then they put sucker pipes in there to keep that air circulated. They'd suck the air out of there, and then the fresh air would come back in.

You've learned a lot over the years, you know, starting out as just a young kid. All these experiences are meshed together. It's hard to separate where you learned any one particular thing.

Well, up there in Butte some of that timber was square set.

Square set is like what was at Virginia City?

Yes, and then you had Mitchell timber. That's when they send logs down to you about two feet through and twenty feet long. You pull them up on the muck pile, block them in, and then you slush out from under them, stand your posts under them, and then you put four more holes in there. The vein of ore was about four feet wide. And when you'd come back in the next morning she was twenty feet wide, or twenty-two. So that's the way you'd put the timber in—pull it up on the muck pile. This big log was a slusher if we drilled a pin hole up there and put a snatch block in. Then you'd drag that log up there and block the ends in, put two

by twelves and two banks in sixes, whatever. They always sent you down some about two feet long, maybe some of them thirty, and then you'd wedge them in. You'd drive wedges in them to fix that cap just as tight as you could get it. Then you'd pull the muck out and put posts under. Put some lagging on top of it, and you're good to do it.

And lagging is what?

That's the two by twelves that are five-foot sets. You just cover the whole floor with them, and if you have to notch them to get around some rock or something, why, you can do that. A lot of times you leave two or three of them loose so that you can pick them up and clean the floor off.

The lagging, if I remember right from the last time we talked, looked like lath and plaster to me—like you would have on a wall. Is that right?

Well, no. That's when you're putting the gob in. You put them on the sides.

And the gob is?

Just waste. You throw the waste in behind it, and that kind of helps hold the walls back. The lagging can go on top, too. See, you just lay it right on your cap, and that keeps dirt, rock, and stuff from coming down on top of you when you're working underneath it, and that also makes a floor for you to work off of.

Let's go back to those Mitchell timbers, because I'm not sure I followed exactly how that works. You're using it to hold the walls apart?

Right. Hanging wall.

And so what you're trying to do is prop those up in there between those two walls?

Well, you pull them up on the muck pile. See, there's a big pile of muck in there where that comes down, where you shot it. You pull a cap up on top of that muck pile and get it just where you want it. Then you start putting these two by twelves in.

And the cap is a log?

Yes. Like this was a piece of lagging. And we'll make that two pieces of lagging, or boards, to block in with. So you drive a nail in here, and you drive a nail in here, and then you can hang those up there. Maybe you'll hang three or four of them, and maybe they'll be three or four deep. But you drive a nail in, and then you can hang that on your cap. The cap will be sitting here like this. Then when you get them all laid in there these all go down. You get to drive your wedges in between the blocks, and that cinches it right in there. You put them in there with a single bitted axe that probably weighs about six pounds. You can get back and haul on them and drive them. Sometimes there will be two of you driving on the same one, so you can keep your weight coming in from both sides, so you don't knock out the other side. Block in both ends. Like that log went across here like this. That's kind of a crooked log. And you do the same thing over here. You block her in.

So you're blocking in the ends of the log to hold it in there between the two walls.

See, your blocks can be laying down like this, and then you drive your wedges in here.

To tighten it up.

Yes. Two by four wedges cut point to point. You cinch them in there and pull the muck out from underneath them and set your posts under them. They send you down posts about this big around. Stand in right underneath it, and on another set below you.

And they just keep building up. It goes in just like a square set, only it's so damn much bigger, and there's a lot less timber involved doing it this way. See, on that twenty foot cap you'd only use three posts. The ground wasn't heavy; it was squishy. It came in from the sides. This ore body laid in there about four inches wide. Well, this is the ore body here, and this is a true hanging wall, and a true foot wall here, but this was a kind of a gob in between them.

With the ore body right in between the two.

Yes, the ore body laid in here, but you couldn't hold it, so when you pulled it out, all this came in with it.

But you don't want those coming in?

This stuff here may have gone through the mill and made them money. I don't know. We didn't know what the hell we were pulling out. It could have been worth five hundred dollars a ton, or it could have been worth fifty dollars. I had no way of knowing.

Yes. But your job was to get the vein out?

Yes, that one right there.

And to do that without the hanging and the foot wall coming in on you.

Yes, we didn't bother these at all. But this was kind of a gob that ran along both sides of it. You only put four holes in it, and one stick of powder in each one of them. The rest of it came in with it, and the next morning it was all down. You'd find all kinds of rock like that.

Now, was that what you were working on with Martin? Was he working on a vein?

Oh, no. We were just driving a drift straight through solid rock. We were

following a little old vein in there about four inches wide. We had good walls, foot and hanging walls, on it.

It was solid. You didn't have this soft stuff coming in?

No. There was no soft stuff in it. So you just broke that out. And part of the drift was running on a true hanging wall. Then they left it for some reason, I don't why, and went straight on back and left that hanging wall.

What is a true hanging wall?

Well, it'll be solid, and it'll be sitting right there. Usually, it's right along the ore body. And sometimes it isn't. Sometimes a foot and hanging wall can be just twenty or thirty feet wide. So you never know, until you get it opened up, what it is. A lot times you'll be following an ore vein, and you never ever see a foot or hanging wall, because you just don't want to break out that far to get to them if there is one in there. Sometimes there isn't one. Depends on what kind of ground you're working in.

I worked the old Bohemian Mine at Cottage Grove, Oregon. I was a mine foreman up there. That's where they ran that crosscut and hit that big body of ore—a kidney they call it—and it was rich.

Were you there when they found it?

No, that was long before I got up there. We were pulling a stope. All that ore runs anywhere from thirty-six inches to four feet. You cut a hitch in both walls—the foot and hanging wall. You put them in there, and you wedge them in. Then you put your lagging over the top of that so you can drill up, straight up.

My nephew and I were working in there, and we had to pull all of our buzzies and everything up, and all of our steel and powder and everything about eighty feet on

a rope. So I told Bobby one day, we were going to put in a tool shed up there where we could leave the tools at night, so we didn't have to haul them up on a rope. We had to go down to get our powder, but that wasn't nearly as bad. We just set some posts in there and put a shelf over the top of it, so the dirt wouldn't fall down in it. We pulled up in there one morning about a week after we built it, and we were sitting there having a smoke. Over in the end of the stope it started coming in, and it just kept coming. So Bobby started for the ladder. He thought he could beat it down. I got him by the suspenders and pulled him back up in there. I said, "There's no way you're going to beat that rock to the bottom." Hell, that was eighty feet down that ladder. So I got him back in there, and it caved off. Well, we were eighty feet up in there. This hanging wall came off about that thick—about three feet wide. Caved off right alongside of us. We were sitting right here. Caved off right there where that last stope was, and it quit. I thought, "Well, boy, we better get down out of here." Then I turned and looked, and the other side of where we were sitting started coming loose. I said, "Just sit right here, Bobby, and hope to Christ this holds." Well, that peeled off on both sides of us, and here we were sitting in the middle of that thing, in that little tool shed. As soon as it quit, and it got to the end, when it was about from here to that door, I said, "OK, now let's get the hell out of here." And we had to go down there and dig a way out. But we got out, and we didn't go back in there any more.

Was that pure luck?

Luck. Good Lord was looking after us. I've come awful close But see, the good Lord takes care of you when you're a damn dummy. [laughter] Some of them mines, the guy's a damn dummy if he works in them. We never did go back in there. That stope, as far as I'm concerned, is still caved in. They

pulled all the ore out of it and took it and ran it through the mill. But that ground was still working every once in while. If you go in there, you can hear them coming down. There was another old stope in there that had been run years and years before, and the boss was talking about maybe opening that up. Well, I went up in there and took a look at that, and I said, "If you want that opened, you're going to have to do it by yourself." Hell, it was thirty feet wide in there, and big slabs hanging every place.

Is that the closest call you ever had?

Oh, no. I had a lot of them. One time we were cutting a pillar out of big, old stope in Butte, but we didn't know we were in a pillar. We thought we were stoping up on solid ground on one side of us. We came up through there, and there was a hole about this big just below where we started to work. I said, "What do you suppose that hole is down there?"

"Hell," he said, "I looked at it, and it's just a bug hole."

You know, sometimes you run into a bug hole. It's got crystals and stuff in it. Well, anyhow, we were drilling, and we had two buzzies going in there.

Tell me what buzzies are.

Well, some people call them stopers, but a buzzy has a stinger on it, and it pushes itself up as it drills. You stand there with a button, and if it hangs up, you hit that button and slow it down.

So you were drilling above you?

Drilling straight up. We were drilling along there, and I reached over and tapped him on the shoulder, and I said, "Listen." We shut both machines off, couldn't hear anything. We started them up again, and I could hear a moan. Just a moan. We shut

them off three times. And the next time—neither one of us shut a machine off or anything—we dove for that damn hole down below us, and we went through it. It wasn't any bigger than this. We both went through it at the same time with the electric lights on our belts and hit a damn slope like this. We had drilled, cutting a hitch out of a pillar between two old stopes and didn't know it. So we went down

That was all that was holding them up?

Yes. That pillar was all that was holding that up, but they wanted that ore out *now*. They didn't give a damn about killing miners, because they had the rest of the mine out there for miles. So we skittered down this incline to where the old chute was. We kicked a couple laggings off of the chute and got in there, and then we tore some off of the other side and got in the manway and went down. The motorman was down there when it started down, and he heard it coming. He just reached behind him and pulled the pin and left the ore car sitting there. He made it out with the motor.

We walked down that drift, because you couldn't go the other way, and it says, "Exit to the Belmont." Well, hell, the Belmont was about four miles over from where we went down. So we started walking, and we finally got over there. They were just getting ready to go up on the cage. We walked up there, and the foreman came up and said, "Where the hell did you guys come from?" So we told him we had come from the Never Sweat.

He says, "Well, we'll go on up. We'll take you up, and we'll get somebody to haul you over to change with." So they took us up to the top. Somebody loaded us in a pick-up and hauled us back to a change room. And we didn't go back in there, either.

I don't think I ever did any stoping in the Never Sweat. I was driving drift in there most of the time. That was an old fire field.

It had been on fire for a hundred years. Rock will burn. You bet you, it will. And it creates its own oxygen, too. So, we were cleaning up a lot of these old drifts, going back into where that fire was. Every hundred feet we'd cut a hitch in the drift. I think they were twenty feet wide. They would put double doors on it for the cars to come out of, and they would gunite this all full of concrete. These double doors were all sealed, so that if the fire broke out they could shut the air off on it. It wasn't going to put the fire out, but they would shut the air off there. What I was always worried about was going in there and running into a bunch of the old timers that didn't make it out, you know. But, hell, there wouldn't have been anything left of them, anyway—that was a hundred years ago that it caught on fire. More than that now, because that was back in the 1940s when I was working up there.

Let me just get a little bit of a sequence. You started when you were nine, working with Martin. And where was that?

Haley, Idaho. The old Tramp Mine. I stayed up there one summer when school was out, about three months.

And then where was your next job?

I broke horses, and I worked on ranches.

So it was a while before you went back to mining?

Well, when I got a little older, we might go out and work in the woods or sawmills or something, and head for the mines in the wintertime to get out of the weather.

So you would do that as a wintertime job, because it's nice underground in the winter?

Well, it's pretty hot. Now, the Orphan Girl in Butte, they made face powder of it talcum powder and stuff like that, but it was manganese. When you went down the shaft there, when you got to the bottom, why, you were sweating, and by the time you got back to where you were working, why, the sweat was running out of your boots. Then, when you came back out, by the time you hit the top of the shaft, your clothes were froze stiff as a board, and you ran from there to the change room, about fifty yards. It sounded like armor going across there, all them guys clanging and banging the clothes on them. It would be forty, forty-five, fifty below zero sometimes. By the time you got to the change room and hit that door and got to your locker, you were melted down a hundred ten degrees in there.

So was a lot of your experience in the mines around Butte?

Yes, I put in a lot of time there, and then at Coeur d'Alene. Hell, I worked the Sunshine there and the old Morning Mine and Burke.

So all through Montana, Idaho, Oregon, and Nevada. Let's talk about Nevada. When did you come to Nevada?

1956, I think it was. I came down here as assistant manager for Copeland Lumber in Carson City, but I didn't stay there very long. If you ever worked for Copeland, why, it's a pretty chintzy outfit. Anyway, I was working, and the hours I was putting in, and the amount of money I was being paid, I figured it up one time—I was getting thirty-five cents an hour. So old Red, the bookkeeper, came down and wanted me to take an inventory—all these places around. I said, "Well, you're going to pay my expenses aren't you?"

"Oh, no. You have to pay them yourself."

I said, "To hell with you!" I got up and walked out, and I never went back to work there.

So you didn't do any mining when you first came to Nevada in 1956?

It wasn't too long after that that we had a mine at Kings Canyon out of Carson City, right straight up behind the courthouse. I had two partners, Roy Winters and Homer Taylor. Neither one of them would go underground. There was an old fellow there named Burt, and his dad raised a family there. But it was all caved in. Most of it you couldn't even tell there had ever been a mine there. He told me about this, and he said there was some pretty good ore in there. So we went up there. There was a drift that went off of a canyon down, so I started opening up that drift. We were running on rails made out of two by fours. You set a two by four down on the sill, and you cut notches in it, and set another two by four in it like that, and that's what your car runs on. If you're going to be using it a long time, you put a little strip of iron on top of it.

But it was wooden rail? It wasn't steel like we think of rails?

No. Well, if you're mining poor, you do what you can. I ran that drift and cleaned it out for about 150 feet. I went through a couple small cave-ins. The ground wasn't that bad; it just sluffed a little. I got back in there and ran into another pretty good-sized one, and you could look way up in there. It would have taken me only a few days to get that cleaned out. So old Roy had his Cat up there, and he decided that he was going to go on top and dig a big pit up there. So that's what he did. They wouldn't even go down in that pit, after he dug it, to cut samples. What they would do is take one or two rocks down and get them assayed. Pick up some pretty

rocks, you know, that looked like they might have something, and go get them assayed. That's no damn good.

Were you beginning to realize they didn't know about mining?

Well, I knew they didn't know anything about mining. I had thought maybe they would go underground and help me get that drift cleaned up, but they didn't.

Tell me about assaying. Just picking up a couple rocks—what's wrong with that?

Well, you have no idea of the overall stuff that's going to go through the mill. You might pick up a rock that's worth three hundred dollars, but you have all this other stuff going with it that's going to knock it way down. You can't pick up two or three. You have to make a cut across the whole face and the sides and everything. You have to take it out of everything that's going to come out of that mine. It's got to go through that mill. So that's what you have to assay. You can't pick up a rock or two and take them in a sample.

It's got to be representative of what you're going to be dealing with.

So anyway, Roy said he was going up there and open-pit that. I said, "Roy, there ain't no damn way you can do that."

Well, he said, "I want you to come up there and cut a sample."

So I took a powder box up there, and I cut samples all the way around that. Cut different places all the way around, so it comes from the bottom up to the top, and put it in powder boxes. They just stood up there and jumped up and down, "You're getting dirt in everything in there."

I said, "How the hell do you think you're going to open pit that without getting dirt and stuff in it?" So I took them and left samples from here to Salt Lake.

You got it assayed at several places, then?

Oh, yes, and when the assays came back, two-thirds of them wouldn't pay for digging the damn hole!

There just wasn't any value?

Not that much value. That was just stringers in there, see.

What was it running?

The old man never did tell me just what it was running, but he said he raised his family up there. He was hand working it, taking out the rich ore, if he had a little rich ore.

Not doing open pit method?

Working it like a poor man would, if you got a little stringer in a mine, a little, four-inch deal here, that's pretty good high grade. Oh, ounce and a half or two ounces. What you want to do is run a waste drift right alongside of it. Run that drift right like that. Then you go in there, and you hand pick this off and sack it up. That way you can high grade it out.

Otherwise, if you take a five-foot drift, and a little old stringer like that, you got four inches of ore, and that's just two-thirds waste, see. That just tears the little, old four inches down to nothing. So that's what you got to watch when you're high grading out like that.

So you assayed this, and it didn't come back with enough value to do open pit mining?

No. So he ran into a mine up there in Round Mountain. He wanted me to go up there. And it was antimony. Now, I don't call it antimony. I say it's "alimony," because you could work like hell and give it away, is what you do. [laughter]

I took a truckload over to Salt Lake, and they split three ways. We got seventeen dollars and fifty cents apiece back. We had been taking some of it to a mill at Austin, and we were getting about six or seven dollars for a truckload. When we took it to Salt Lake, that old boy over at Salt Lake says, "Do you want a referee on that?"

I said, "No. I'm going to referee it myself. If I can make some money, I'm going to keep mining. If I can't, I'm going to quit. I'm going to load my tools up and go home."

What does that mean, "referee it"?

Well, they give you somebody to run samples for you. Well, they're all in cahoots, anyway.

So you kind of watch over, then, as they're sampling?

Well, yes. They're supposed to be authorized people that you can trust. When he is working in ore, a miner doesn't have any way of knowing. So he makes a deal with the mills, smelters, and they give him back just what he wants from assay. When they sent that back to us I loaded my tools up and came home. That was hand cobbled. We cobbled everything off but the pure old antimony. There was no quartz or anything left on it. Should have been running pretty good. Well, like some of them loads we would send over to Austin—one of them went nine hundred dollars, and the others never went over six. That was about a five-ton load. So I don't know how they would come out with seventeen dollars and fifty cents apiece. I had to pay for the trip over there and back with my truck. I wasn't making any money.

You hear people talking about a "ringer" in the mines. That means they work five shifts without missing one.

Without ever stopping to sleep?

Oh, no. That's just eight-hour shifts. That's a ringer. If you make five, that's a ringer.

And then what's a "boomer"?

Most of the miners are single guys. A lot of miners just stayed in the mines all their life—some of them in the same one, as a matter of fact. But the boomers, they would work, maybe, four or five ringers and get enough money to move, and then they boomed off; they would go some place else. If they had any money when they got there, they would rustle a job and go get drunk until the money was gone. Then they would go to work. They would put in another hitch like that—maybe four or five ringers—and then away they would go. They called them boomer miners. Most of them were contractors. The more ground they broke, the more money they made. See, if you were driving drift you got eighteen dollars a foot for two guys. You had to put that all on ore cars and have it at the shaft for them to haul up. Then you got eighteen dollars for timbering and running. If you were running a raise you got eighteen to twenty dollars. It depends on what's what. That's a running foot and a two compartment raise: an ore chute and a manway. That gives you a chute to hold your ore in; and your air hoses, air lines, and water lines all come up the manway.

Then, if you're working in a stope you get paid by the cube. The more cubic feet you break, the more money you make. They have a man who comes in and measures up every Friday night, and then your check is there the next day. Or sometimes they'll measure up on Thursday and then pay you from Thursday to Thursday. The more ground you break when you're gypoing, the more money you make. That's the only way I work. What were they getting—eight, nine dollars a shift—up there in Butte?

Yes, we were making way more than that. Same way, when we were contracting in the construction game. Blanche and I were finishing houses down there in Cheyenne and Laramie, and we were making a hundred and twenty-five dollars a day. I'd cut the baseboard all out and nail it, and she would set the nails. She would put the collars in, and she would mash her finger, and you could just hear her—pretty near burned the house down! Turned blue in there. [laughter]

So you worked together on those kinds of jobs?

A lot of times she helped me.

BLANCHE SHIPLEY: When we went to work there, this old man who laid the floor said, "You'll never catch up to me." And Bill and I finished a house in a day.

Bill: Well, we finished several of them and caught up to him, and then he took a job contracting for another company.

Blanche: He was so mad because we were finishing houses so fast, and right behind him. And he got so mad! [laughter]

Bill: Well, he went to work for me, finally. He was seventy-six years old, and he couldn't stand up.

He was bent over?

Blanche: He grew up bent over.

Bill: He traveled just like this. He had a hatchet about that wide with a handle on it. He would reach in that apron and come out with his old, gnarly fingers, and he would wiggle them like that and hit the nails and wouldn't miss one out of fifty. You know, he never held a nail down there. He would just drop them out of his hands and hit them with that hatchet. He had been laying floors

all his life. It took him a day and half to lay a floors, and Blanche and I could finish one in a day, so we would catch up with him pretty quick.

So we went to work for another outfit, and we worked finishing houses for them, and then he finally got to work for them. He was flooring for them.

I want to go back to one of the terms that you used. You said, "hand cobbled." What does that mean?

Yes. Hand cobbled it off. That's driving the waste drift alongside of an ore body. I worked one in Park City, Utah, at the old Judge Mine, and it was ruby silver. Some of that run 98 percent pure. We ran a waste drift along there and put canvas down and hand cobbled that off with a pick. Just picked it off on to this canvas and put it in sacks about this big around and about that long. That's about all you wanted to pack.

That's when you were taking out just the high grade as you worked?

Right. Well, we would pack that all down with us when we would go out at night. That all went out. The rest of this stuff went through the mill, but this was so damn high grade, they didn't want it mixed in with the other stuff. Sometimes, you would find a little red thing that looked like lipstick, that was a little bigger than a lead pencil. You could take it and write on the timber, just like a piece of lipstick. That was 99.9 ruby silver. Damn near pure.

After you did these things at Kings Canyon and Round Mountain, did you do any more mining before you came to the Monarch here in Nevada?

No, I found the Monarch when I used to run mustangs back here. Every time I was after a herd of horses, I would come through



Landscape surrounding the Monarch Mine

this country, and I would go over these old dumps. I would stop and get a beer can, cut the top out, and take some home in my saddlebags. Found gold in every one of them, every one of them that I checked.

In 1979 Blanche and I got the claims over on the other side of the hill. I went down and asked Don Bently if I could lease his from him, and he said, "I would, but I lost them." He said, "Hunt beat me out of them, because the lawyer didn't put in my assessment work."

I said, "Well, you get down there and record them right now, and I'll go up there and do some development work on them." So he did, and he leased them to me.

About a year later I went down and asked him, "What would you take for those claims?"

He says, "Five thousand dollars."

"I'll buy them." So I bought them. We got four claims.

Four claims? But it's all called the Monarch Mine?

Yes. Well, there's two Easter Days, and two Rosies in there. I bought two Easter Days from Don. Then Gus, my brother-in-law, put one above and one below in his name, and they're the Rosie claims. Then there's an Easter Day fraction over on the south end, because when my brother-in-law put his claims in I told him we needed a Dutchman. He's bullheaded as hell. What he had done is come down four hundred feet and run the claims alongside the Easter Days, and that left this piece in here: 1,200 feet by 400 feet. A regular size is 600 feet long and 1,500 feet wide. So that threw us off balance. Then,

when Pegas had a lease on it, they put one up there. See, it's landlocked, and that's private ground. This is Stoddard Jacobson's land. Anyway, I just took that one in. It runs right to the top of the hill, but mine goes past it. In case that runs over there, then I have another 400 feet right here.

And this is on BLM land. So what do you have to do with the BLM?

Well, we have to fill out all the papers on what we've done and pay them \$5.00 a claim to record them. Plus, we pay \$7.50 for each claim down here at the court house.

Blanche: And do assessment work.

Bill: Well, you got to be mining.

You have to show that you've done work on it?

It used to be if you do \$100 worth of work on each claim, but now they've got it changed around to where you can leave them sit and pay them \$100 and not do any work—because that's disturbing the surface. This bureaucracy and these environmentalists have just about run the damn miners plumb out of business. They're trying to. Hell, they've come up there—the BLM—and done all kinds of things to try to spook me, but it didn't work.

What kinds of things have they done?

We had to sell our horses. Couldn't have horses on a mining claim. Now they got it so that wherever you're working right now . . . I can't even go up and prospect on the other claims.

Why?

Don't ask me. It's their new laws. You can't disturb any surface ground. You just

work right where you're working, and that's it. I've got four claims up there. I'm only working about 60 or 70 feet wide in that pit. Now, I've got to stay in the pit. I can't go down a shaft and work on that quartz vein I have down there, and if I do, I have to put up a \$350,000 bond, because I changed my plan of operations. So that's why I have to just keep going in there until I run that pit into the quartz vein before I can take it out.

With that kind of a price—a \$350,000 bond—are these rules more designed for big companies, rather than a small mine?

They should be, but they fit everybody.

One rule fits all. But \$350,000, that's pretty steep for a one-man, one-woman operation.

Blanche: But that's why a lot of mines are quitting now, too, because the price of gold is so low...

Bill: A lot of the big mines are shut down. They just have little skeleton crews. I don't think they bother them so much, because they have a different set up, but they're just trying to run all the little miners out of the mountains. They don't want anybody off the damn highways. They have the highways all fenced now so you can't get off of them. They tried to close all the roads back here in the Pine Nuts, and the people raised so much hell that they decided, well, you can't build any new roads, so you got to stay on the old roads. But next year they'll come out, "Well, we closed this one, and we closed this one, and we closed this one." Pretty quick, you aren't going to get up here. In other words, what they're doing is just like they did in Germany and Russia. They took the land away from the people. Now, they're starving to death, because they tried to get those big co-ops going. Those people would go out there and show up for work and run off some

place and hide. They wouldn't run out there and work like they did when they owned that ground. Hell, you work twenty-four hours a day when you're a farmer or a rancher.

Or a miner.

Bill: Yes. And they're going to do the same thing here.

Blanche: Well, another thing is that Bill's nephew that lives up there and mined with him—they said he couldn't have his motor home up there. You can't have a trailer or a camper. They made him get rid of his motor home. You can't have a boat.

So all you can have is the home that you're living in?

Bill: Yes. This new deal that came out, now, you can have something up there for recreation, but that was after they ran my damn horses off. We had five horses living up there.

So now you're limited just to that one pit where you're working, and you can't do any prospecting on your other claims?

Nope. You can't even go up there and dig holes.

Everybody that I've talked to in the larger mining companies, the whole time they're working a mine they're also prospecting for new finds.

Sure. They're prospecting, but they're big outfits, and they can't fight them, because they have too much money. Whenever they take somebody to court, it costs them \$300,000. And BLM doesn't have any money. They have their deal whittled down now to where they just damn near ain't doing anything, but sitting around the offices.

So how do you learn about these things? Did somebody come out and tell you that you had to get rid of your horses?

Blanche: Oh, yes. It's a compliance specialist with BLM that comes out and tells you.

Bill: You can't have horses on the mining claim. And that big Imperial Valley—there used to be small farmers all along the roads everywhere. Now they have one front man that runs that whole thing around Yuma. He is the head dog. He's financed by the government. All he is, is a front man for the damn government, but he owns the ground now, because the government financed him. Down through the Imperial Valley, across the river in California, there's two running that whole thing. All them little houses are gone. Moved them out, because they would farm right up to the edge of everything, and they had no wasted ground. And all financed by the government.

Now, we've got some friends back in Nebraska that are wheat farmers. They had their place all paid for, didn't owe a damn thing. He had his cattle, and he couldn't sell his wheat—they came out and locked his wheat bins up. He couldn't sell a cow. If he would load cattle to a sale, they wouldn't even let him unload them. "You're either going to borrow some money from us, or you're going out of business." So, he started to borrow money. Then they were putting out these subsidies for not farming the ground. So if he would buy a ranch, they paid him subsidies. He would pay the ranch off and buy another one. He had five thousand acres of ground. He died, and now his kids have that, and they had to keep buying, otherwise they couldn't sell their grain or anything. All they are is front men. One of these days, all they have to do is hit a bad year, and the government is going to have the whole damn thing again.

So is there a similarity to you and what's happening here with the miners and the BLM?

It's similar. What they're trying to do is take all this mining ground. See, they know where everything is, because it's all on paper, and they're going to run all these miners off. Then they're going to lease this ground to somebody who is not mining. That's exactly what they're headed for.

Is there a conflict when this young woman comes out from the BLM to tell you these things?

Bill: Well, it ain't always her. She's staying up there in the office most of the time now, but we have another guy that comes out.

Blanche: He comes out, and he's pretty aggressive.

Bill: He's not really aggressive. He just comes out and looks at it and says, "Well, I want to see that mill working when I come back."

Blanche: When Bill had his shoulder operation, the BLM man said, "Next time I come here I want to see that mill running."

Bill: So I got the hopper, and I built a top on the hopper—the one that goes into the mill—so it wouldn't get wet. The next time he comes out, I'm going to turn the son of a bitch on and say, "Now listen to that." I'm going to put him right in there where that ball mill is, and he ain't going to get no ear muffs, either.

Blanche: And besides that, the generator was sabotaged. For a year we couldn't even pump water or anything, you know.

Tell me what happened to the generator?

Bill: Somebody went down in the pond and got some silica out of the pond from the mill and put it in the bearing on that generator and burned it up. It cost \$1,500 to get it rewound.

And you've got a theory about some of this damage that you're seeing out there.

Bill: I have a pretty good idea. Now, I don't know that he did it, but he had somebody do it. I'm not going to say anything about that, because I might get him cornered sometime. This is somebody that had a lease on it one time. He's the one that covered that drift up, filled up about thirty-five feet of that shaft.

Blanche: It's full of timber and stuff.

They want to drive you off, because they would like to have that lease back again?

Bill: Sure. Yes. That's right. See, that's the heart of the whole damn operation is that generator. He figured if he would foul that up, put that out of business, and cover that quartz up, so I couldn't show it to anybody else, why, then he could get it. But I wouldn't sell it to him if I was starving to death. I might blow his damn head off.

Blanche: We're staying there, anyways.

You're not moving. [laughter] Let's talk about the mine area then, and let's go through it like you did when you actually showed it to me the other day. First of all, you've got the open pit. Tell me about what's down in there. You said you have several kinds of gold in there.

Bill: Yes. We found six different deposits. It's deposited six different times in there, God only knows when. Some of it's in the quartz; some of it's around the quartz; and some of it's in the clay. It's mixed all through



Bill and Blanche Shipley, standing next to the Monarch Mine Mill, the hopper behind them.

everything down there. That's why we can run everything out of that deal, and run it through the sluice box and the trommel, and get that clay and the free gold, then run the tailings off of that through the mill.

So, because there's so much and so many different kinds, this does lend itself to open pit mining.

Oh, yes.

It doesn't have to be underground.

No.

I was reading some of the history on the Monarch. That's how it started, as an underground.

That was underground, yes, because they didn't have equipment to open that up. They didn't have open pit. The only thing they had was horses and Fresnos to work with.

You bought this in the 1980s?

I bought this about 1982. We staked those over there in 1979, and then we bought these a couple, three years later.

And tell me about what equipment you're using for the open pit? What have you got up there?

I have a D-4 Cat with a yard-and-a-half bucket on it. It ain't a farm tractor. It's one that was built for the Seabees. I think it's a 1952. I've had it for twenty-seven years.



The Shipley's D-4 Cat, used for mining

And then you've built a lot of the equipment up there.

I built it all.

So you use the Cat to get the ore out of there. Tell me what the process is.

Well, we run it through the sluice box, or trommel, and take out the free gold. Then we run the tailings out of that into the mill.

And you've built the mill, too?

Yes. It's a gravity feed—everything except the conveyor from the crusher to the hopper above the mill. Everything gravity feeds down through the ball mill and onto the Wilfrey table. Most of it's what I gathered up and put together. I bought the ball mill from

Don Bently, and the Wilfrey table—I had to rebuild that whole thing. All that is the bottom frame of it. I had to rebuild everything.

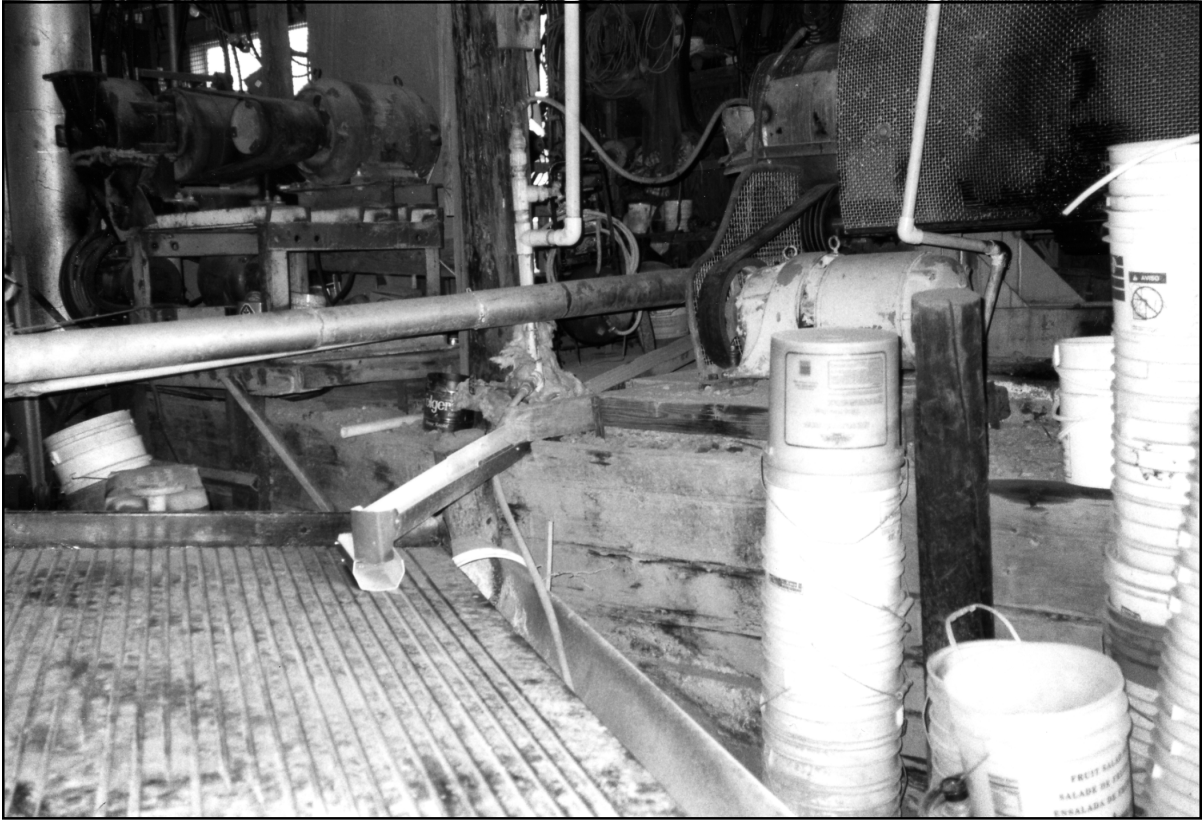
I also see you've got equipment in there to do some assaying.

Oh, yes. I have a lab.

What are the little ovens?

They are assay ovens. I've got four of them. I only have two of them hooked up there, but I have two more in the mill that have to be hooked up when I get that other building up.

Yes, and I saw the crucibles in the dishwasher there.



Wilfrey table in the Monarch Mine Mill

Yes. Then I have a big crucible. I showed that to you didn't I—that one over in the corner? It's about this big around and stands up about this high. That will melt down two hundred pounds of concentrates at a time. Gas fired. I got part of it built, but I haven't got it completed yet. There are mercury switches on it, and then if anything goes wrong, why, it shuts her down right now.

And the whole thing is operated from this one generator—the one that was sabotaged?

Yes. Everything runs from that. That pumps the water, runs the mill, and the electricity, everything.

Tell me where the water comes from.

Out of a well. It's 400 feet deep with a 7.5-horse pump and a water meter on it. Because BLM made us put a water meter on it.

And who do you pay for the water?

The water is state water. We have to pay them a hundred dollars a year until we get that thing set up to where we can start running year round. Then, whatever water we can use running the year round, that's how many acre-feet we get, if we can use that much. There's no way we can pump that much water out of a 7.5-horse pump. We can get 73 acre-feet, if we could use it, but that was in case we got into something that was real good, like that quartz vein, and wanted to expand the mill and stuff. Why, then we would have water enough to run it, because

if you put a couple big ball mills in there, that won't be enough water for them.

Because you're using water for the sluice box. You're using water for the ball mill and the Wilfrey table. Right?

Yes. And the trommel, but the sluice box runs right into the trommel.

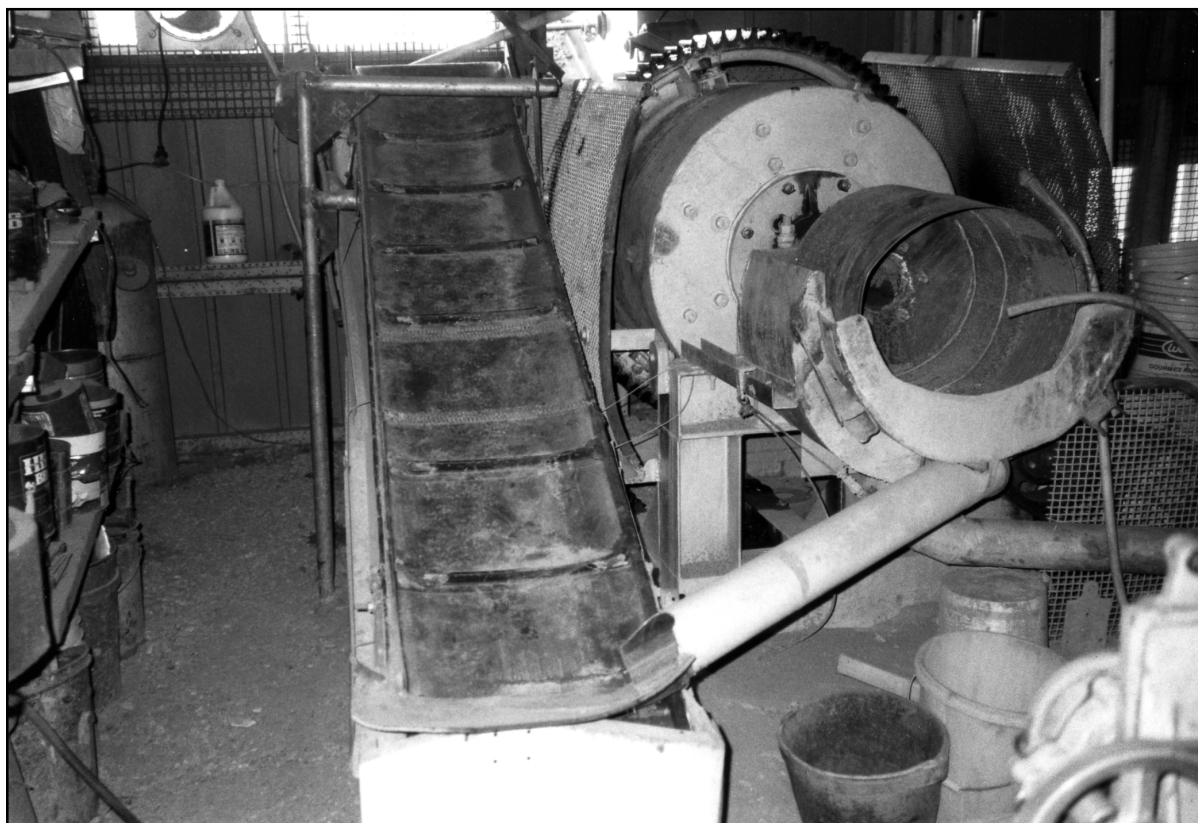
That's where you showed me where it settles down. It's kind of like a grate that it settles down into? Is that the trommel?

Yes. That one that's round down at the bottom. See, that turns it, and any clay that doesn't break up, in the sluice box, then that trommel stirs it up and breaks it up. If there's any fine gold in there, why, it just catches

it, and that will stop up the sluice box. We get some pretty good nuggets out of there once in a while. Not all the time, but sometimes. Last two years all we've done is fight for parts. We had a big yard sale to get enough money to pay for that generator.

So the last two years haven't been going very well?

They haven't been the best, no, because we haven't done a damn thing yet. Last year the bearing went out on that Cat, and that's when they were having that UPS strike. So they ordered a bearing, and it was for one of those little, old farm tractors. Well, mine's about this much bigger and heavier built. We finally got one out of Salt Lake, and that's when the strike was on. That laid six weeks



Monarch Mine ball mill

over there in a warehouse before we found it. Put a tracer on it. It takes a damn good week to tear that thing down, because you take everything from the motor back off of it to get to the gears. We just got that fixed, and the reverse gear went out. That took us three months to find parts. And the generator was down.

Blanche: We got the generator from Minnesota, and we had to send for a manual to see how to put it together. We thought it was a board, electronic board. So we got a new board and the parts for a board. It wasn't that. And then he went in and checked and found it was the generator itself. We didn't know it was the generator.

Bill: See, when they put that silica in there, the fan just sucked the silica right into the bearings and everything in there. And then when that dropped down, after I oiled that bearing, stuff started hitting the field. That blew all the wiring in there.

So is this something that you're able to fix?

No. I had to take it and get it rewound—all that new copper in there. Hell, as heavy as that is, there's probably three hundred pounds of copper in that wiring

And so you're working on it now?

Yes. Well, I think all that is, is there's two settings on there. One's an equalizer, and the other's a voltage regulator. They're little deals that stick up there, and they have a setscrew on them. I was loosening that setscrew, and I thought well, hell, something's wrong, because I think it's turning underneath. I had to take some more stuff off, and they were turning underneath. So I have to get them set back up. I think they're still all right. But it just takes time. I worked on them until four o'clock last night,

and my fingers got so damn stiff I couldn't hang onto anything, so I quit.

And I was going to ask you, are you able to work year round?

We can if we get into that quartz where we don't have any clay.

But as long as you're in the clay you need water?

Well, no. We can't get it through the jaw crusher. Now, I can fix that.

Because it's wet.

Yes. It doesn't have to be wet, just damp, and if it gets in there, it just pounds into that jaw crusher like concrete. You have to chisel it out.

So that's why you have to wait for summer—for it to be dry?

Yes. Now that quartz, see, if I can get that out there, there's no clay in it, and I can run that year round.

Blanche: But the trouble is the mud, too, in the wintertime.

Bill: We can eliminate that, too, with a little gravel. So, if we can get set up and get to running year around, why, then we come out of there with some pretty good money, because that quartz down there runs one ounce and a quarter. If I can run eight yards through that mill a day that's pretty good wages.

You said your nephew, Bobby, just passed away recently, but he had been working with you on this?

He had been up here with me for ten years.

So what are you doing now to be able to work this yourself?

Blanche: I'm Bobby.

You're Bobby now?

Bill: Well, all she's got to do is sit up there on a chair and punch buttons, anyway. Well it's all set up.

Blanche: I'm not working in that mill with that noise.

Bill: Well, I got some earmuffs for you.

You said you liked it better when it was at a different stage—earlier on.

Blanche: I liked it with a dry washer. You should talk about when we first started up there with this primitive dry washer. I don't think anyone in Nevada ever uses that. Without water, that was the only way to get gold out.

Bill: Well, I built that dry washer, and we ran sixty to eighty yards a day through it. But we hit the first part of the dry spell, and then the last year we worked that dry washer, we got into the wet spell. We had to hole down where Tedd is working now, but we used to have them claims.

And that's your neighbor, Tedd?

Bill: Yes. So it was too wet to really be working, but we were working it.



Dry washer used by the Shipleys

Blanche: We lost a lot of gold.

Bill: Tedd ran our tailings and done damn near as good as we did. We took sixteen ounces out of there in eight days.

Blanche: But then we didn't work the rest of the summer because it was all wet.

Bill: Well, that hole filled up with water where we were working, and it stayed there for two years. But it was good.

Blanche: It was good, but, probably, three or four weeks is as long as we ever worked this summer, because of so many rain storms. There were a lot of rain storms.

Bill: But we made pretty good money when we were running that. If it's damp, see, the clay won't turn loose of the gold, and it just goes on off.

So the drought years were good years?

Bill: They would be good years.

Blanche: They would have been, but we were over at the Monarch on the drought years. We had already left those.

Bill: But we ran the Monarch there for, what, two or three years.

Blanche: With a dry washer.

Bill: Maybe more than that. We got a big dump out there. The guys go out there and dry wash in that dump. There have been five or six 1-ounce nuggets picked out of what we've already run.

Blanche: What he lost on the big dry washer.

Bill: But I had a guy working with me then. He just came up there one day, and he

says, "I want to go to work for you, and it don't cost you nothing." So I said OK. But he was raking them riffles off before the big nuggets got a chance to get down in the riffles. That's why they're all out there in that dump. So, we've got to rerun that all through the sluice box.

Blanche: I would run the dry washer, and my sister did, and his sister, and my cousin. We were all on that tailings dump where he lost it, and we were all doing great—better than he was. [laughter] Because it was wet, and he lost an awful lot of gold in that.

Bill: One time it went through that thing. It dried it out quite a bit. Moving it and dumping it and stuff. They were taking in more gold than I was.

So this mine, is it earning a living for you?

Bill: Yes. Well, we can make a damn good living up there—except when we're broke down.

Blanche: I wouldn't say that.

You wouldn't agree with that? It doesn't seem like a living?

Bill: Well, she just wants to live higher on the hog.

Blanche: Well, it just costs so much to mine. And with the gold so low, you know, well, you can't hardly even . . .

Bill: Well, everything we took out of there we put back building that mill and stuff, see. As we were making money we were putting it back in—getting our machinery and stuff for it.

You've got quite an operation up there.

Bill: Oh, yes. All of it costs money. I don't know how many fifty-pound boxes of welding I've run into that thing, but a bunch of them.

Blanche: Another thing is that when the gold is low there's no prospective buyers or investors, either, because when the gold is this low, you know, people aren't interested.

Bill: No. Nobody's ever invested anything there, but us. We got two houses and everything else we had in it.

Now, tell me about how you sell it. Once you get the gold out, where's your market?

Bill: Well, we made a lot of jewelry and stuff out of some of it.

Blanche: And the refinery in San Diego.

Bill: We'd send it to a refinery and get it cleaned up. Before, I sent eighteen ounces, and they paid me for two ounces. See, I was leaching at that time, and it just looks like a red powder.

Just a concentrate?

Bill: Yes, about the color of your coat. I sent that down to him, and he didn't understand what the hell he was doing. Anyhow, he ran it through again, and when he did, see, it still had sodium sulfate. That's what drops your gold out of your silver and stuff, and then you filter it. Your gold goes through the filter, but the silver stays in it. Well, when he did that, and that sodium sulfate was still in there, see, that had the gold collected, and he just filtered the damn gold out and threw it away, I guess. Or else ran it through and kept it. I don't know.

Blanche: He might have had some new help, because always before he had done really good with us. So he might have had some new help.

Bill: I just don't think he knew what the hell to do with it. I should have told him, or I should have took time to melt it down, is what I should've done, but there was sixteen ounces of goddamn gold that I lost that year.

That's a lot. It's gold and silver that you're getting out of there, both?

Bill: We get mostly gold. There's very little silver. If I get an ounce of gold I get less than a half ounce of silver. I keep it for collectors. Sodium sulfate when I get done with it. Or silver nitrate, and that's what they fill your teeth with—for years and years, and everybody's raising hell about mercury, you know.

Yes, mercury in their teeth. So, you guys have been at this since 1982?

Bill: We've been up there twenty years, since 1979.

Blanche: We sold our house and then moved to the mine.

And where was your house?

Blanche: On Windmill road out at Fish Springs. He built a house.

Bill: That was right out here in the valley. We were the fourth house that went out there. We lived in tents while we were building the house.

Blanche: And then he conned me into moving to the mine.

Bill: I'm just a really good con-artist. In that mining game you get pretty wise, you know. [laughter]

Blanche: [laughter] It's really hard when you go to move. Anyway, you take everything

from your house, all your electronic stuff, all your electric stuff, and then move and squeeze everything into a 23-foot trailer with no electricity. It's really hard to go back down like that.



You've had different experiences with BLM.

Bill: Oh, yes. Well, we had one real good inspector that used to come down here, but he took an early retirement and got out of the rat race, I guess. Bill knew a little bit about mining. Some of the newer ones haven't got any idea about mining, but Bill gave me a triple A rating on that mine up there.

He thought you were doing a good job?

You bet. When they give you a triple A rating, that puts you way up there.

Referring to what—how you're operating, or how you're treating the environment?

That takes in the whole thing. The overall mining deal. Mine doesn't look too good, because I haven't got room to put a lot of that stuff inside, but I got this other building going up here in the next few days, and then I can get that yard cleaned up a little bit, because I got stuff sitting out there. I got a band saw and a planer and a whole bunch of stuff that's been sitting out there in the weather for years. When that all gets under the roof then I can set it up where I have something I can use again.

Right. So you had some good experiences with BLM, and that was when you first started up there?

Bill: Yes. Well, ever since they started to come and look at them.

Blanche: At first when we were mining they didn't have any inspectors. There wasn't a BLM in Carson City, either. No one even came up to see us or anything. They just left us alone.

So it's changed over this twenty years?

Bill: Oh, yes. It's just about, here the last seven years that BLM started coming around. Well, it was a little earlier. It was when old Bill was here. That was 1983, 1984.

Blanche: Bill started coming up. I'll tell you, the BLM from Reno are really good, too. Several of the BLM from Reno have been there, and they're really good. I mean, we go in there, and there's this helpful Elaine Lewis. They're just as helpful, because, you know, she tells us everything that's going on, the changes. They're good as they can be. They know us better.

Bill: Most of them are pretty good, except, like I said, the one woman who wants to show her authority, you know.

Blanche: Well, it's just, I guess, they've got new rules all the time, too.

They have different personalities and new rules, and so it has changed.

Bill: Well, then you get some people coming out of there that don't know what a mine is or how they operate or a damn thing, and then they're coming out there and raising hell with you.

Blanche: I don't see why we had to get rid of our horses. I told them, and they said, "Well, you can't have horses on a mining claim."

And I said, "Well, we use those horses for checking our posts, because people are always taking our posts out." They'll put a

post right up against the tree, and it's hard to see a post. They take our posts out, and we would check them with the horses.

Bill: We came back from Arizona one time, and I don't think we had three posts left on the claims. They took the four by fours. Used to be four by fours, you know, looked just like a piece of tree. They would take them out and maybe pack them fifty yards and set them up right against the trunk of a tree, and then you had to go around and hunt all them up and bring them back.

Blanche: One time we came back just when that one guy up there with a tool box in back of his pick-up was out there taking our posts, and he said he was looking for his dog.

And you knew he wasn't.

Bill: No, he was exercising his dog. Well, then that Bristlecone Mining Company came up there one time, and they had some big old ghouls down here. One guy was about six foot six and probably weighed close to 300 pounds. Ran me off the road down here one night. He got me standing there by the window talking. So, I was talking to him, and he says, "You know that Bristlecone's going to take those claims?"

And I said, "No, I don't think they are."

He said, "How long you had those claims?"

I said, "Seven years." And that's after we had talked to him for, probably, fifteen, twenty minutes.

He said, "As far as I'm concerned that Bristlecone's dead." So, he just got back in his car and took off.

Then the Bristlecones came up there—a guy and his son. That kid had been up there before, and I didn't recognize him until later. They came in, and they said, "Well, we're going to go to court on these claims."

I said, "I'll go to court with you. I got the judge and jury right there in the house. Whenever you're ready to go, just get the hell up here." Never saw them again. They just thought they were going to spook me off of there.

Blanche: But you know, it makes you so mad, and you work so hard to get something, and somebody wants to take it away from you.

Bill: We lost our uranium claims that way, too, but I decided that was the last time we would ever do that.

Where were the uranium claims?

Colorado.

Were people running you off?

No. We signed some papers. We thought that the guy wrote down He was taking notes like that, and when he came back with the papers I thought that's what they said. You know, I didn't read them. Dummy. That's the education that you get. I got a hell of an education from mining. I just as well went through college. They ain't going to catch me that way again.

You got your Ph.D. in mining? [laughter]

Anyway, I came damn near wiping out about five of them. If Blanche hadn't got out there and stopped me, I'd have killed them.

Because the papers said what? I mean, how did they arrange it so you lost it?

Bill: Well, we were supposed to get 10 percent.

Blanche: And they said, "We're mining it now."

Bill: What they came back with was that they had to come up with 10 percent of the mine to pay for the claim, see, the assessment work. I had a Cat and drillers up there all the time. I had ten backers over in Sidney, Nebraska. So I got these guys up there doing assessment work and stuff, you know. You had to have a hole on each claim, and I think we had twenty something.

Blanche: We had a 1,300-foot mill.

Bill: The whole mountain had ran 1 percent. Old Maynard Osborne was a go-between for me and these other investors. I wrote and told him I had to have some money to pay off the cat skinner, and the engineers for surveying. Well, all the other people gave him the money, and the old bastard wouldn't send it to me. So there we were sitting, broke, and nothing to pay these guys with, and old Maynard sitting there holding the damn money, instead of sending it to us.

Blanche: Well, anyway, in Colorado, what people did during the uranium boom, they would sit around in a bar someplace and find out somebody that had staked some uranium claims. Then they would come out and stake all around you, and they would say, "Now, you know we staked all around you, you know. So you join our corporation." We didn't know what a corporation meant.

Bill: Well they didn't stake around us. They were all ours that were staked.

Blanche: Well anyway, we signed the corporation papers.

Bill: Yes. That's what we done.

In this process you thought you were getting 10 percent?

Blanche: And instead we had to pay.

You had to pay 10 percent, and that's how you lost it?

Blanche: The only thing we ended up with, after being all summer in Colorado, was when I helped the surveyors survey the claim, and we got \$600 for that summer.

Bill: She got \$600. She was a rear chainman on them.

Blanche: That's the only money we got. And we just walked away and left the claims, because rather than fight, and him get that mad, we just walked away. So we never did know what happened to those claims.

Bill: They lost them. They didn't know what the hell to do with them after they got them.

Blanche: We don't know what they did with them.

Bill: Oh, yes. I called the damn lawyer, if you remember right.

Blanche: He probably lied to you.

Bill: He said, "We were going to put it on the stock market," but something went haywire. I don't know what it was.

Blanche: They were named the Blue Ribbon uranium claims.

Bill: I don't know whether they changed them or not.

You're feeling like there are people that would like to have these claims?

Bill: A whole bunch of them.

How do you know about them? Have they talked to you?

Bill: We've talked to some of them. Or they've been down there and checked the papers over dozens of times—several people. See, if there's one little flaw in there someplace that they can jump on . . .

Blanche: Well, besides that, there was one man that came up there, that we knew in Arizona, and he staked all over that mountain.

Bill: Nine hundred acres.

Blanche: And he kept telling his family that he was going to get those claims. You know what? He ended up being killed in prison, in Florence prison. But he was so aggressive. He was always on a motorcycle, and he was always saying our claims weren't right, too. But he staked all around us, and he was going to move his mother-in-law and all his family on those claims up there. He just got too aggressive. He met a gal in Ashland, Oregon, that had claims, so he started working her claims, and she had timber, so he started timbering off. And so he went in California.

Bill: Now, hers were patented claims.

Blanche: He went in California, on unpatented claims, and started timbering, logging those unpatented claims. And so the FBI, and the CIA. . . .

Bill: They had four city blocks blocked off in Ashland, Oregon. He told them he was going to blow up the whole goddamn town.

And this is the guy that was out here trying to get you boxed in.

Bill: Yes. He staked all around us.

Blanche: Every year he would come, and he would just . . .

You said you were never going to let somebody run you off again. What do you do about security?

Bill: Make damn sure the papers are all right.

Make sure all the legal documents are right?

Bill: If we get that filed down here, and we get it over to them a month and a half, two months before its supposed to deadline.

Blanche: And if you do your assessment work.

Bill: You don't put it in on the thirty-first of December. You put it in on the thirtieth. You see, there's another little catch. If you go in the thirty-first you've lost your damn claims. You've got to have it in by the thirtieth of December. But they don't tell you that until it's too damn late. I went over there one time and took a bill of sale, and that old gal in the office that records them says, "Well, I'll keep this and give you a copy."

I says, "You'll play hell. I want that original back, and you keep the copy." Because, see, she could have taken that and sold it off to somebody, and had me in a goddamn corner. Have to go to court, and I didn't have money to go to court, so they would wind up with it. You can't believe how crooked some of them are. There's only one thing crookeder than a con man in a mining game, and that's a politician. They're the only ones that are crookeder.

Blanche: That's what happened so many times.



Bill, you were telling me the story of when you and your nephew built a tool shed, and

I am afraid I didn't quite get the reason why you two survived that, as it started to cave in. Would you explain that again for me?

Well, we had that timbered up real good in there, because it had to withstand the blasts and everything else with our tools on it. We had good hitches cut in the foot wall, and the hanging wall was blocked in real good, and that's what saved us, because it caved off right up to us, set there for a few minutes, and pretty quick it started peeling off on the other side of us. But the tool shed stayed in there, and so did we. And it was a good thing we did.

It's a good thing you built that shed in there, or you wouldn't be alive.

A survival instinct or something.

Speaking of survival instinct, you said that there was another story that you wanted to tell about when Blanche almost killed you?

Yes, she did. Damn near give me a heart attack. We were prospecting for uranium, and up on the side of this mountain was a yellow streak. I thought maybe it was carnatite, so I went up it, and it was pretty well straight up and down. I had to climb—we didn't have ropes or anything. She wasn't supposed to be climbing—she was down on the bottom. I told her, "You stay down here, and I'll come back off the other side of the hill," because you couldn't come down—it was too steep. I got up there and checked it, and there was no reading in it, at all. When I got past that I had to keep going on up, because it was kind of tipped underneath, and you had to finger and toe your way up. When I got to the top I look behind me, and there she was! There was a ledge that came out a little ways, and she got up and got ahold of that ledge and froze right there. I mean, if she'd have turned loose, she would've gone straight down for a hundred and fifty feet. I

told her not to come up there at all, but when I tell her something she doesn't listen.

Anyway, I was hanging over the edge of that thing and telling her where to put her fingers and toes and everything. After I got her where she could turn loose and move again, I coaxed her up over the top, and then the blue smoke flew for two hours.

Blanche: You know why I didn't stay down there? It was getting toward night, and it was a canyon. I didn't want to stay down there alone in that dark canyon, because he's going up over the mountain, and it will take a long time for him to get back.

Bill: I would not take a long time.

You were afraid?

Blanche: Have you ever froze? If you're tired and you're just stuck right to the side, and you can't move?

Bill: She would have run 150 feet straight down before she hit anything.

When you said that there was no reading, what were you using to read?

Bill: Geiger counter. We had our little burro over there with us. I used to take her. I went over there about two months before Blanche came over, and she stayed right with us. She's just like a dog. I didn't even put a halter on her. I put a pack on her, and she would follow me.

Had a guy out of Utah drop me a card, wanted me to come over, said he's got a real good reading over there, but he couldn't find it. He could get it with a scintillator and airplane, but he couldn't find it. He was an old cowboy on horses, you know. So I went over there. It was in different layers.

Blanche: It was a plateau.

Bill: Yes, down there in Utah. Well, they're just pieces, and then it goes a little ways, and then another piece. So I went up there, and I had one canteen of water. Going across the creek, we were going up. It was only about three feet deep, but that little burro lost her footing. It was pretty swift. She went under a log. I had a rope on her that time, and I kept talking to her and calling her and telling her, "Come on, you can make it!" She had a pack on. Pretty quick, she worked her way loose, and she came up out of there. After we got up on top, yes, we ran out of water, but it had rained some. Some of the old salt holes had alkali salts in them. She wouldn't drink it, but she would get a mouth full of it and rinse her mouth out and spit it out.

We were up there for three days before we found that. What it was, was a dinosaur bone about that big around, and about that long. I just broke off a little chunk of it, probably weighed forty pounds, that one little piece. But that's what he was getting his reading off of. It was under a kind of cap. I drilled holes in there and shot the cap off of that and couldn't find another. After I pulled that bone out there wasn't another reading in there. It was just a dinosaur bone. That's where a lot of uranium comes from.

But anyway, we were up there three days, and they'd had a big cloud burst up above us, and when we got back down to that creek, it was a river. Oh, it had widened out about twenty feet from what it was, and it was running six feet deep. I thought, "Hell, I don't want to go across that." And she didn't give me a chance. She just hit me in the back with her nose, and we went across. [laughter] We were swimming, but we got across.

She made that decision?

Yes. I thought she wouldn't want to go across there again, but she took me across.



You also said that you had a story to tell me about honey buckets.

Yes. That's what you got down in the mines. They usually have them sitting right at the tail end of an old drift that they've started off on and quit. That's where you park the honey bucket. And all it is, is an ore car with a top on it and a toilet seat. Whenever you start down one of them drifts, about half way to the honey bucket, the hair starts standing up on the back of your head. You get down there to the honey bucket, and you don't spend too much time, because they got chemicals in that tank, but it's still got methane gas in it, and it gets you if you stay in there too long. I think that's why they do it, so you won't be resting.

No loitering. That was the way they handled that in the old days?

Yes. Then once a week they would bring the honey buckets out and dump them, take them back in. But that was your restroom when you got down the mine. You always avoided them just as long as possible. [laughter]

I bet. Tell me about some of the miners that you've worked with. Have you stayed in touch with any of them?

No. I worked with miners for years. Maybe I would work with one six months and never know his name. He was always your partner, "Hey, Pard, how you doing?" I worked with one guy up there; I can't remember what the hell his name was now. But that's about the only one that I ever knew

his name, outside my brother. My brother and I used to work together up there at Butte. But remembering names is something I've never been able to do. I haven't got any idea where any of them are. I imagine a lot of them died off, too.

You said there was one town where a lot of them went and just stayed. Where was that?

That's in Deadwood, South Dakota. Homestake Mine. They get in there, and somebody's got to die before you can get a job in there. They don't move. I guess it's a good mine to work at. I never did work up there. All I've done is go up there and set tanks for an oil company. Twice I was up there, but never did any mining up there, at all. Black Hills, South Dakota.

Now, your neighbor, Tedd Webb, is just over the hill from here and has a claim?

Yes, he's got five or six of them. See, they're old claims that we used to have. He's putting a ball mill together now, and he's supposed to have some real good rock up there, but I don't know. I haven't seen it yet. He's got some there that will make him a good living. It runs one-third of an ounce to the ton, and a lot of it. That drift goes back about 100 feet, and then there's an incline that goes down about 30 feet, and it's just all in ore. You can go up on the surface and trail it for 150 to 200 feet long, both ways from the drift. So, he's got a lot of ore there if he gets into that, and where he's going now is supposed to be real good, but I don't trust the guy that did the drilling and assays work. I ain't going to say who it is, but . . .



It seems like there are a lot of obstacles in the way of the small operator when it comes

to mining. What do you think the biggest obstacle is?

Bill: Well, there's a lot of new laws that I don't even know anything about. Laws on staking claims and all different types of that . . .

Blanche: Revisions of the 1872 Mining Law.

And that's causing you the biggest problem, is it?

Bill: Well, it doesn't really cause me any, because I've already got my claims. And somebody was telling me it costs you—what the hell did they say—\$100 or something to file a claim? I don't know. Anyhow, from what I've heard, it costs you quite a bit to get a claim. They've got all kinds of laws. So far, they haven't really bothered me too much, because I'm in for a patent on this if they ever take that moratorium off. If I had gotten a good engineer in the first place—that didn't take three years to survey, what, four claims—I'd have gotten in there the day before they put that moratorium on.

So, there's a moratorium on patenting mines right now?

Bill: Yes. You can't get a patent through. What's his name?

Blanche: Babbitt, Secretary of the Interior.

Bill: Got them all sitting on his desk down there, and he won't let anything go through. Only the big mining companies—they take him to court and get theirs through. But the little guy ain't got a chance of getting one through until they take that off. They may never take it off, I don't know.

But you've filed for one, and you've got all the paper work in?

Bill: Yes.

Blanche: We had to pay a lot of money for an engineer to make sure that they were correct. All the claims were correct and everything. It took him a long time to just get the surveys in.

Bill: Three years to survey four claims. He was just too damn lazy to get the paper work in.

Blanche: His works had to be okayed at Cadastral.

What is Cadastral?

Blanche: That is the one that does the patent, Cadastral Survey.

Bill: Yes. It's part of the BLM. Their engineers have to come out and check the claims, and they engineer it themselves and make you change anything that's not right.

So you get it surveyed, and then they also double check your surveying?

Bill: You bet.

Blanche: They check to make sure we have the ore. But they already know it, because they've seen our ore.

I see. So, you're in that process now. And what's the advantage of having a patent?

Blanche: Well then you can do anything.

Bill: Unless you have to drive over BLM property to get to your claims, and it's patented. If they drive over BLM ground to get to your patented claim, they still have jurisdiction over it. But on mine, now, they

won't have jurisdiction, because I have private ground right to the edge of my claims. The road comes in there, and then when I get the patent on this, it belongs to us, and they have nothing to say about it.

Blanche: You own the ground, and you have to pay taxes on the ground, then.

Bill: Yes. After you get a patent, then you pay taxes on it.

Otherwise, you're dealing with BLM on all their rules and regulations about land use?

Bill: Now, I can't even go up here and do any prospecting on my other claims. Only just right there in that pit.

Right where you are. So the rest of the claims just lay there waiting?

Bill: Yes. I got ounce and a quarter gold up there on one of them. I've checked, and there's gold on all four of them, but I can't go do any development work on them, because if I do, then I have to put up a big bond.

And that's the \$350,000 bond that you talked about?

Bill: Yes.

And the moratorium, that's federal, not state?

Blanche: That's federal. And when we asked BLM in Reno, they said they had no idea when it's going to come off. It goes in effect every September, and then they keep extending the moratorium. September is when it's supposed to be off, but then they extend their moratorium.

Bill: That one girl that came over—she's an engineer, and she works for BLM. She

works for the Cadastral, and she came over and surveyed these, and she's a real nice gal. You can go over there and see; she's somebody that you can talk to.

Blanche: They're all pretty nice over there.

Bill: And what's that other little gal?

Blanche: Elaine Lewis.

Bill: Elaine Lewis. She's just great. She tries to help us every way she can, but hell, her hands are tied, because she doesn't dare do anything, just can't do anything. She said, "I don't even know if I'm going to be here tomorrow." [laughter] So, they're having problems of their own, too. I think they're cutting their allotment down quite a bit, because they used to fly this, and take pictures with airplanes all the time. The last two years I don't think they've had the money for that, because if you go up there and move a shovelful of dirt, why, they could tell you, you know.

They know you're doing it, then. So, regulations and bureaucracy are really obstacles for the small guy making a living?

Bill: That's what's raping the small guys, yes.

What else have you run into? You've had a number of things happen the last couple of years.

Blanche: People trying to take our claims.

And how can they do that?

Bill: Well, they can't, really, but they can tie you up and get you in court. That Bristlecone Mining Company was going to. They staked all around us while we were in

Arizona, and pulled our posts out and put them in trees and everything else. I told you about that big, burly guy. Ran me off the road.

Yes. He's in prison now?

Bill: I don't know where he's at. No, the one that went to prison, he's dead. Somebody stabbed him about seventeen times.

Blanche: There's always somebody trying to, seems like.

Bill: They thought I was going to just walk away if they came up here and gave me a bad time. I told them, "Hell, if you want to go to court, I got the judge and jury right there in the house. Just come anytime you're ready." And I never saw them again. We lost our uranium claims on a deal like that.

Blanche: But lately, we haven't had any trouble. When they know we're in for a patent, I think that makes a difference.

Bill: Well, it's all surveyed in. There ain't no way they can come up here and say, "Well, they didn't have it staked right," you know.

I see. So, that's been a benefit in another way—by keeping some of the undesirable people out of your way.

Bill: Oh, sure. Yes, especially whenever you find something that looks like it's going to make some pay. Why, then they want to come up and stake all around you, so they can get in on that. But I think all this land is open around here, because I think it costs them too much to come up and stake it. I can't remember what Tedd said.

Blanche: Well, you know, Stoddard Jacobson had got the home set, and so he has sold claims on his land right up to our

claims. So, there's going to be a building right up to our claim stakes.

Like a subdivision, like this Fish Springs housing?

Bill: Well, no. They'll be all individual, just forty-acre parcels.

Blanche: But they are selling all of them, right up to our claims.

Bill: But this hill, right behind us here, is sold, and that's the line between our property and his.

So, that's the part that is private land, right up to your property. And then it's BLM on up this other direction?

Bill: Yes, that's east.

Blanche: Well, also, there's private land on this side, too.

Bill: Well, Stoddard owns the end of my claims. That's private ground that way. On the north end, that's all open up there, and everything on the east side is open. Old Maynard had that staked, but he's gone now, so he can't kick about that.

Now, who is Maynard?

Bill: He's the one that got stabbed. He was down there in Colorado, in Florence, the place for the bad, bad, bad ones. He was in San Quentin or something before that.

Blanche: No—another one that's really bad. It's almost as bad as Florence. Leavenworth. He got kicked out of Leavenworth, because they were trying to kill him. One of the other convicts reached through the bars and stabbed him in the head with the metal part of a mop, so they put him in Florence to make him safe.

Bill: He's safe now.

You get some pretty rough characters out here around a mine. Is that what your experience has been?

Bill: Whenever you get into mining there's always a bunch of dingbats. Hell, the people in Arizona, they think they got the Lost Dutchman. Hell, you walk across your property, and you still have to shoot just anything.

Blanche: Well, they'll kill you.

Bill: That old gal down there—I guess she killed several people, and they finally went out and got her. She had two or three or four guys working for her just packing rifles around. She thought she had protection.

Blanche: They all think they've got the Lost Dutchman Mine, and the police around there say, "You're on your own if you go out in the Superstition Mountains. You're on your own, because we're not going to go out and protect you." It's just too dangerous out there in the Superstitions.

Bill: If you go out there, all they're going to do is go out and pick up your body.

Has it been as dangerous here as, say, Colorado or Arizona for you?

Bill: No, we didn't have any danger over in Colorado. Only Blanche climbing mountains.

Arizona was the worst?

Bill: Another thing that you ought to know about is that we had that little burro, and we would go up to that cabin.

Blanche: Thirteen thousand feet.

Bill: Yes, but that cabin was 11,500 feet. The first week we were up there, all you could do was hang to the door and look out.

You had altitude sickness?

Bill: Yes, about a week while we were climbing the mountains, but then you had to stay there until you got acclimatized a little bit. So we had that little burro. We were walking down a road one evening, and there was a pickup load of kids—three of them. They had the best, brand-new gear, I mean, tents and tables and chairs and everything you could think of. Right out of the city someplace. They were going to stay up there and fish for two weeks. So Blanche and I went down the next night, and we were talking to them, and they were sitting there, and they had lights, and, hell, just like living downtown. Jenny got behind us a little ways. Usually, she would look up after she got done eating, and if she couldn't see us, why, she would let out a bray. So, she came down the road, got pretty close to that tent, let out a bray, and those guys came off their chairs about that high. I think I said, "Oh, that's just Jenny." I bet they didn't know what a Jenny was. I told Blanche, "I think they thought that might be your daughter." [laughter] Anyhow, the next day they were gone.

They were scared off by your burro? They thought they had run into some real wildlife.

Blanche: Well, you know, they can sound pretty awesome, if you don't know what they are. And then she was kind of scared if she didn't see us, so she would let out an extra-strong bray.

But around here you've felt more secure than you did in other areas. You haven't had the trouble?

Bill: We never did really have any trouble.

Blanche: Well, there was a place in Arizona—Apache Junction. I'll tell you, people are pretty spooky there, because they were prospecting in the Superstition Mountains, and when they came to town they were loaded. They had their guns, and they were really spooky. You know, like if one would open the door or something, and the other one would touch him, he would turn right there with his gun. So they're ready to shoot. I mean, they were just really spooky.

Really protective of their findings?

Bill: Well, I would call them about half dingy, because they think everything they pick up is going to be gold. Big part of them is only about half there. We were told it would be hell.

Blanche: You know what, too? They don't like snowbirds there. And Bill's sister and brother-in-law were parked out in the boonies with other people, you know, snowbirds. And some guys that had been hunting for javelina came by, and they said, "Well, we's didn't get any javelina, let's get us some snowbirds." So, you know, they're just people who are . . . I don't know.

Bill: Well, hell, they was shooting at their motor homes and stuff.

Blanche: Shooting! They shot toward the people that were up there.

Bill: Then two of them came down. They had been up there hunting and didn't get anything. So, there was two old fellows—they were up in years—and they had a motor trailer kind of set off to the side, and damned if those two hunters didn't go in there and kill them and take all their money. They went right down the road not a mile, to a bar, and started cashing hundred dollar bills. Well, they knew something was haywire,

because they weren't that type of people, so they called the cops, and they got them. They went back up there and checked, sure as hell.

Blanche: Well, in Oldman, too, there was an old couple that made friends with this young man and his wife. And so one time they came back, and they killed this old couple.

How have you two protected yourselves, when you've been out away like this?

Blanche: Well, we're usually surrounded by our friends, you know, but we would go out.

Bill: But I've never had any trouble like that.

Blanche: No, we haven't. But then we don't just go pick up and make friends with anyone. Like this older couple, now, they made friends with this young man and his wife. I guess maybe we have a sixth sense to know when people maybe could be dangerous. And we traveled with a lot of our friends—other snowbirds—in their campers and trailers and motor homes.

And some family, too. You've mentioned brothers and your nephew and so on.

Blanche: Brother-in-law.

So you've had friends and relatives around you?

Bill: No. That's when we were just going down there for the winter, and then we would dry wash while we were down there.

Blanche: When we were in Colorado, though, we were on our own, and we didn't have a tent. We just had a pup tent. We just slept on the ground. One time we just got in

bed, and all at once Bill screamed, and I thought, if he screams, it's awful, and I'm going to duck down, not find out what it is, because it's awful if *he* screams. Next morning I asked him, and he said he was laying there, and he felt a snake start crawling across his face. He waited until it was half way across, and he went, "Aaaaaaaggh!" [screams] And see, it was headed for me. [laughter] I would've still been running.

Bill, I just want to ask you a couple more questions about the kinds of obstacles that are keeping small mine operators from succeeding. What about financing? Is that a problem—getting money to operate?

Bill: Well, it takes money to develop a mine, and we've developed this one by ourselves. We haven't got any money from borrowing or anything. We borrowed some at different times, but we paid them back.

Blanche: Sold two houses.

Bill: If you're going to go mining, and you can't do every goddamn thing there is on a mine, well . . . Your wiring and your blasting, anything you have to do, you have to do it yourself, because you don't make enough money to hire people to do it. All your mechanic work, and everything.

Yes. You've built this whole operation here—all of the mill and everything.

Bill: You bet. You got to be able to do everything, or you just as well stay in town.

Mechanic, electrician, blaster. Mucking, assaying.

Bill: Anything. Hard work. Running dozers and Cats, backhoes, and whatever you got.

Thawing frozen pipes.

Blanche: Bill, that's not all—you've cleaned off other mines and took all the iron and stuff and cut it up, brought it here. And then you drew patterns to build all this stuff up here.

And did the design work, too, for it? Took scrap and built it from scrap from other mines.

Bill: Yes. Things that people went up and left. The promoters—that's where you can get some good stuff, because they promote a bunch of money and go out in the hills and just put enough stuff out there to make it legal, you know, so they can't get them for embezzling. And then walk off and leave it. I can take the stuff that they left and build me something I can use.

I see. So somebody that doesn't have all those skills would not be able to make a living like you have out here? What about operations? I know you've talked about having various things breaking down and so on. What else? You know, you've had weather.

Bill: When it gets wet up here, why, you can't operate a Cat, because that clay gets in the tracks and the sprockets, and pretty quick the Cat won't even move.

Blanche: Bill, tell her about the cave-ins. How many cave-ins have we had?

Right here at this open pit?

Blanche: Oh, yes.

Bill: Well, that doesn't make any difference whether it's cave-ins or not. It's just all got to go through the mill, anyway.

Blanche: Well, it just makes it a lot harder to get back to where we were.

Bill: Well, you have to move it, anyhow, Blanche. That doesn't hurt us; it just slides down off the sides, and it's all got ore in it, anyway.

Blanche: One time his Cat was right down at the foot of it, and it was an old shaft, and we didn't know it. He took out the key rock, and it was just like a great big mouth. That whole thing, red ore or dirt, was coming out like a mouth as he pulled out of there. And it kept on for a long time. We hadn't known it was a shaft.

Bill: It was an old stope or something that somebody had been in at one time.

Blanche: And he took out the key rock.

Bill: Well, it just fell out of there like coming out of an ore chute. We ran on that for about three or four days before it quit running, and there was pretty good gold in it.

Blanche: That one time the Cat broke down right in the bottom of the pit, and there was stuff coming down. He had to fix that Cat, right down at the bottom of the pit where the stuff was coming down.

Bill: Well, we broke a spine of a sprocket. I had to go get a truck and put a snatch block up there at the end of the drift. I borrowed an old army truck with a winch on it and blocked it in good on top and winched it back up here. Then I took it off the snatch block and turned it that way.

Blanche: But another time we took dry washers, because it was all filled up halfway to the Cat, and when we were shoveling we put it through dry washers.

You know, I want to switch, if it's OK with you, and talk to Blanche a little bit about her part in all this mining.

Blanche: Well, I haven't had any part, at all.

Oh, well it sounds to me like you have. Let's go back to the beginning. You were not born into a mining family, is that right?

No way.

Tell me where you were born.

I was born on a ranch in Nebraska. I like cows and horses. I never even thought of a mine.

How did you two meet? How did you hook up with Bill?

Well, I was married before. I lived in Portland. I have two boys. I stayed with my mother in North Bonneville, Washington. She had a dress shop, and I would go to The Dalles and work in the fruit. That's where I met him. My aunt knew Bill and introduced me. So, when I first met Bill it was at a restaurant. I had just come in after working the cannery to get something to eat where my aunt was. We first started talking about rodeos, because I love rodeos. I like cowboys. [laughter]

And he has done some of that, too.

Oh, yes, a lot of cowboying. Watch the way he walks. [laughter] He was born on a horse. So we talked about going to Calgary. We both wanted to go to. We never have yet. So, we started talking about rodeo and everything. And so from then on, you know, we were both interested, so we went to Pendleton, and we went to a lot of rodeos. We went to Cheyenne. He liked horses, too. He stayed there for a while, and he was a

pond monkey. You don't know what that is? They're on the logs on the pond, you know, rolling the log over so they can put it on the deck.

In the lumber industry?

In the lumber industry. At The Dalles he was a pond monkey.

All right. So you guys got together. Did you get married there at The Dalles?

No, we went to Eugene. You know, it's been a long time, and you just kind of forget.

That's OK. Mainly, I want to know when you got married, and then, was it after you got married that you first did any mining with him?

Oh, it was a long time afterwards. I thought I was marrying a cowboy. I didn't know I was marrying a miner. I never even heard of a mine. I never even thought of a mine.

So what was your first introduction to mining?

It was when he moved to Butte, Montana. I've been sick a lot in my life. I had an operation, and I stayed at my mother's. So, when I was well enough I went to Butte. Boy, what an education that was! [laughter]

That was the first time?

Yes that was the first time.

Tell me what happened at Butte.

Well, it's just that there were so many bars, you know. I bet every other door was a bar, because the miners do drink a lot. Everyone was really nice, though. All of them I met were nice. But you know what they

told me when I left Butte? We went from Butte to Hungry Horse, Montana, and when I left Butte they said, "Blanche, you'll be back here, because no one ever leaves Butte, but what they don't go back." They always come back to Butte, but I never have been back to Butte.

[laughter] So, you've learned some other things about mining there, not only the bars. In fact, you mentioned to me the name of one of the bars, what was that?

The Lost Weekend. That's what it was, too. I never even met any other women. I never met any miners' wives, at all.

Really? Were there some there?

Well, sure. There was a lot of miners' wives. Three or four thousand miners worked in Butte, but I never met any of the women, because the men, when they get out, go to the bars to drink, and the women are just home waiting for them, because they don't know for sure if they were killed last night, or if they just have to stop and have some drinks. So I never met any of the women, at all.

So you were really isolated, even though you were around all these people?

Yes. Well, we lived in an apartment, so there were people in the apartment, but I don't think any of them were miners. I never really met anybody. And Bill had nightmares every night. Every night when he would come home he had nightmares from being afraid when they're down there. They're under such stress. They might say they're not scared, but they are, and when they go to sleep, then it all comes out. He had nightmares, and he hasn't had very many nightmares since I've known him, but he had nightmares there in Butte. There was a lot of awful loose ground up there.

Was there? That was an especially dangerous mine?

Bill: I was working up there one time, and that stope we were in—the three shifts drilled it. Last shift would drill, and then they would load it out. It looked just like honeycomb. I mean there were holes everywhere. Real blocky ground. So, old Bob and I went to work. I said, "Bob, let's go up and look at the back of this thing. I've never been up there." And we were, oh, probably five or six steps up to the back.

That's all I know about Bob. I ran into him one time over in Reno, too. He says, "What the hell you doing down here? There ain't no mines around here."

I said, "I quit them."

He says, "Well, hell, those guys have been drilling in here the whole time, it ought to be all right."

And I says, "Let's go up." So we did. There was a mining bar laying there against a timber, and there was a slab out there about this thick and probably eight, ten feet wide. I just reached over and got that bar and reached out there and touched it. And down she went, took our machines and everything down. Tore out timber all the way to sill.

Blanche: See, they're always living under stress when they're mining.

Bill: If we would've cracked them machines, we would've both got it, because we were ahead. And when it came down off that timber it just took everything out right to the face of where we were working.

There was another thing I wanted you to tell, while we're on tape, Blanche, and that is, you said the wives didn't know whether the men had been killed. What would you hear?

Blanche: Well, you would hear the distress signal. Nine bells was a death.

Bill: No, actually, nine bells is an accident; it didn't mean you were killed.

You didn't know whether they were killed or not?

Blanche: You could hear it all over. I mean, it was loud. And whenever you heard that, you knew something had happened.

How often would you hear that?

Blanche: Oh, every night.

Bill: No, not every night. Maybe two or three times a week.

Blanche: Well, it seemed to me like it was every night. [laughter]

And then you didn't know until they came home or didn't come home.

Blanche: There's no way until they get up out of the mine, there's no way. I don't know, maybe there's someone on the outside that would tell them.

Bill: Well, hell, I don't know how many mines there were up there—probably 150 mines, different holes.

Blanche: That whole Butte was all undermined?

Bill: Well, they open pitted that, I think. Moved the town down in the flat.

Blanche: It was the ugliest place I ever saw in my life. All it was, was gallows frames all over the place. No trees, no flowers, no anything—just mines. I thought that was the awfulest place I ever, ever moved to.

Did you ever help Bill with mining, or was it mostly Bill mining and you staying at home?

Blanche: Well, whenever it was in the underground mines I didn't help.

Were women even allowed underground at that time?

Blanche: It's bad luck for a woman to go underground.

Bill: Well, yes. You took a woman down the mine in those days, and everybody left.

Blanche: Boy, those guys would take off. Yes. It's bad luck.

Bill: Now they have women working underground.

Yes. That has changed in your lifetime. So you didn't go underground. When did you first help him? Do you remember?

Blanche: Well, I didn't help him in Hungry Horse. In Hungry Horse he worked on that dam, and I didn't help him there, at all.

In Colorado you were helping him?

Blanche: Oh, yes.

Bill: No, we were prospecting then; we weren't doing any mining. But she never helped much around the mine, at all. We've run them little dry washers, and things like that. Not until we got here, I don't think.

Blanche: No, not until we got here. I didn't help, but I always worked. You know, I always had a job in every town. Except the mining towns, I didn't work there. I don't know why I didn't work there, but I've always worked and had a job to take care of the kids and things.

Bill: When we left Butte and went to Hungry Horse, that's about the last mines I

worked in. Only the ones over here in Round Mountain, when we were working over there in that antimony.

So, there was a big break in there before you came to Nevada and started on this mine. So, Blanche, what kind of jobs did you get, generally?

Bill: Well, she was a checker at a grocery store.

Blanche: I was rear chainman one time.

For a survey crew?

Blanche: That was on uranium claims over in Colorado. In Nebraska I was a checker in a grocery store. My boys would go home every summer, see. That's why I could go with Bill all over, because every summer their dad had custody of them, and they would go out to Oregon. When the boys were out there, then I would go with Bill, whatever he was doing. I had been a telephone operator. I was a change girl at the Nugget in Carson. I used to help him build I didn't help him build—I helped him cuss when I would get in the closet putting all the base down. [laughter] In the closet it didn't show, so I would do all the things that didn't show. I've helped him shim up the doors. He and I finished those houses really fast, because the two of us work well together. We finished a house in a day and a half.

Now, when you came here, you were running the dry washer. Some people wouldn't know what that is. Tell me what you have to do to run a dry washer?

Blanche: Well, first you have to start the darn old Briggs and Stratton engine, and sometimes they take a long time to start, just like a lawn mower. You know, those lawn mower motors? Well, they're just really hard

to start. Then you just shovel dirt in the screen, and it goes down in the bellows, and it goes in trays underneath. If the trays start running over or something, well, then you take the trays out. And you have to get them all lined up. First, you go through the riffles to see if you can see any gold. [laughter] And that's what you can't wait to do, to see the gold. Then you pour it in a pan, and you have some water, and you pan it. But also, you've got a header pile and a tailing pile. That was fun, because I like seeing the gold.

There were about three or four of us women. When Bill was mining over there it was so wet when he had that big dry washer. All of us, the women, would dry wash on his tailing pile, because he lost so much gold because it was wet. See, when it goes through the dry washer and the air, it kind of dries out. So we would be in those big piles that he left, and we would all be getting gold that he lost.

And you liked that? [laughter] So, did you not get hooked on this until you got here and started seeing that gold?

Blanche: Oh, I liked that, and I liked it then because all of our friends were parked around us. We had great fun. I don't like it now. I don't like that mill—it's that noise and everything, and you can't tell what you get until it's all refined, and it goes through the process. Before that, in the dry washer, right away we could tell what we got. Every night we knew what we got. I like the shaker screen and the sluice and all that, because then you can see gold, too. But I don't like going through that mill. I just don't like that. It was fun, and all of us have had a lot of fun. We had three or four of our friends or relatives parked around us, and all of us women were dry washing, and then we would go pan.

This one time, they were all panning the same barrel. So I panned what they left in the barrel. I thought, "Well, there's no use

me dry washing, because I'm doing better with what they lost." [laughter] I was finding a lot of gold in their tailings in this barrel. So I would do that everyday. And so, one of them decided that maybe he had better have his own pan of water at his trailer. I was finding too much.

You were getting too much of the leftovers?

Blanche: Yes. But it was fun.

Bill: Most of them didn't know how to pan. They were washing out their gold.

Blanche: Yes, they were. But it's lonesome here; I get lonely. You know, I'm a people person, and Bill's got his friends. He goes over to the other miners over the hill and everything. I miss friends. We used to have like four or five different trailers that lived around us, and all of us women—we would walk. Also, I had my horses here, and I used to ride. Now the BLM said we couldn't have our horses.

So it's really changed for you. All the things that you like about it, you don't have anymore.

Blanche: No.

Bill: Well, if she gets all welled up again and gets her shoulder so she can use it, she can go up and dry wash.

Blanche: I do like to dry wash. It's fun, because you can see right then what you get. Every night you can dump this tray. And besides, we women didn't wait till night. But usually, the men would wait, and they would do the whole thing—you know, wait a long time, and wash them. We didn't. We would wait, maybe, couple hours or three hours and say, "Well, let's try it." And you know,

we got more gold, too, because we didn't let it fill up so much. All of them—my sister got gold, and Bill's sister got gold, and all the women—they had their own gold. So it's fun.

So, do you think you've got the gold bug? Are you hooked on this, or is it such a hardship?

No. I don't have the gold bug. I like seeing it, when you get it, but gold as gold doesn't mean anything to me. It's just a way to make a living.

Talk about how you've financed this.

Well, Bill built some beautiful houses. They were beautiful. He could do anything—that's the trouble. If someone can do anything, they kind of flit around. But anyway, he's a beautiful carpenter. So we had a house in Carson City, and we named Ponderosa Drive. Everything was just perfect for me, because I used to be tall. And the counter tops were tall and everything. The cupboards, a nice sink in the bathroom—everything was custom built. We had about four or five different types of paneling in the wood. And everything was just perfect, but then . . . I don't know why. Oh, I know why he decided. He's like a miner; they just say it. Well, at night they might come home and say, "I'm going to rustle another job." Just like that, and the women have to pick up and move. They always know their husband might, you know. And you're just moving all around.

My family used to say, "That's going to ruin those kids—going to so many different schools," because they did move around a lot, but it didn't hurt the kids at all, moving around a lot, because they did very well.

In Carson then, he was a cabinetmaker. We had a modern kitchen-cabinet shop. Carson was in a depression right then. So, he went to collect his money, and sometimes

they'd been gone in the middle of night. They would leave him without his money. So he just got tired of it. He said, 'We're going to sell our house.' And he said, "I'm going down to Gardnerville. And I'm not going to even tell them I'm a carpenter. I'm going to start shoeing horses." That's what he did. He came down here to shoe horses. But when we were in Carson we always used to ride across here with our horses. He would always have a can and take some dirt back and pan it. Always he got gold from this mine up here. For years someone else had it. So, when he finally hit the last, when we did come here, why, Mr. Hill had died, and then Bently had it.

And is this the same Bently that has the big corporation here?

Yes. And then he had lost it, and Bill saved it for him. So then he bought it pretty cheap from Bently. Then we sold our house. We came down here, and we lived in apartments, and those apartments are terrible. We had some land down on Windmill Road. I told Bill I would rather live in a tent than live in these apartments, because people were fighting, and you could hear everything they said. So we bought three tents and lived in tents out on Windmill Road. Toward winter it was getting kind of cold in the tents. So then we had a chance to tear a house down in California. It took us all summer to tear that house down and move it in sections. Then he built the house on Windmill Road. We lived there several years. He was doing Cat work. Also, he was interested in this mine. He would go over in those claims and do prospect holes all the time.

So, the house on Windmill Road then, what happened to that one?

Bill sold it. [laughter] Two houses.

And then you moved up here with a camp trailer?

We moved up here with a 23-foot trailer. But first, we used to go and camp on the other side, on the other mountain, over the summer.

Over where Tedd is?

Yes. We kept our house for several years. We moved all our mining stuff down on our property, and we would rent the house and go to Arizona several winters. Then we got too much up here, where we can't do that. We sold our house, and all that money's gone into the mine.

So you went from a house with electricity, phone, all of those things. Describe now, for people who might be studying this in the future, what you've got set up here at the mine.

Well, people are just amazed. When store checkers ask me my telephone number, I say, "I don't have a telephone."

"What's your address?"

"I don't have an address." I mean there's no name on our road. And I don't have electricity.

"How can you live?"

But it was hard coming from a house, and I hated to give up my sewing machine and my food processor and iron and all that stuff. It was hard to leave my house and move into that 23-foot trailer, because I loved my house, too. It was the handiest thing. Of course, then there was other people; our other friends moved up here, too, and they all have the same thing. We had to haul water from our house. For several years we didn't have water.

But you've got water now, right?

Yes, we do have water. That's a big help. The men used to go down to haul water, and the women were all in the same situation. My cousin was one of them, and the one that helped him mine was another one. There were two cousins, Kenny and Donna, and our friends too, Betty and Clint. You have a 12-volt battery for a furnace and 12-volt batteries for the lights. Of course, most people have a generator, too, but it's not like power.

VICTORIA FORD: *Today is December 6, 1997. I'm here with Ed Slavin in his home in Tonopah. Ed, we want to start talking about where you were born, in what year, and a little bit about your childhood.*

ED SLAVIN: I was born in Old Mexico, La Canan in Sonora County, January 5, 1906. The revolution was on at that time, and so all the gringos were on the Capute Hill. The night I was born the Mexicans stabbed my dad in the back with a candlestick. Now, it's cold in January, and a candlestick, not a knife, made three punctures in his back. They brought him in to my mom and said, "We got the wrong man."

They went down and brought up an American doctor, and he took care of my dad, and I guess they stayed with him till I came. Caused my mom more trouble than she had already. Well, I think it was about three weeks after that, we went to Canyon City, Colorado, where some of my mother's folks lived.

Tell me, what were your folks doing in Mexico at that time?

Making tools for them, sharpening the steel in the blacksmith shop.

Because your dad was a blacksmith there?

Yes.

Neither one of your parents were Hispanic, right? You were a white family?

Oh, yes. They were born in New York, the northern part of the state.

How did they end up in Tonopah?

There was a little place out of Goldfield called Diamondfield, and they sent for my dad to come out there to do a special job building a cage for the mine. His brother-in-law, Ed Malley, was the chief of police at Tonopah, and he wanted somebody who could handle the bookwork. My dad had gone to Saint Mary's College of Kansas for two years, so he had some education. He came over here as the deputy police, and then he went up to the courthouse. He was elected sheriff, and then he was county clerk and treasurer for thirty-five or forty years.

So your dad was very much into politics after he got to Tonopah?

Well, of course, I was raised on politics—cut my teeth on it. I like this town; it's a good town to me.

How old were you when they moved here? Were you just a kid?

Yes. We used to steal hay for the burros, and we got arrested and had to go to court. Charles Wittenburg had lots of horses, a big team. He had a freight outfit. We got caught with two sacks of hay, and then we had to go down and see the judge, Judge Cutty. When we went down, Wittenburg presented his case, and then the judge says to me, "Ed, did you steal that hay from the horses, or did you steal it from Charlie Wittenburg?"

I said, "Hell, I wouldn't steal hay from horses. I stole it from Charlie Wittenburg."

Really, what we'd do, is clean up all the scraps around the haystack, and he should have paid us for doing that, but he didn't. He was tight as hell. Anyhow, that's one bad case.

So, you'd say you were kind of mean when you were a kid?

Well, I could handle myself for a little guy. Nobody pushed this little Irishman around, at all. I was so good that if somebody bothered my brother, he would say, "I'm going to tell my big brother on you," and then they would leave him alone.

How many brothers and sisters did you have?

I had one brother and three sisters that lived. There was nine of us all together, and we lost four.

So your brother depended on you to protect him?

Oh, yes. He's one of these guys, "Nope, I won't fight," and he nods at them and just walks off. He said, "Look at you. Look at your nose. Look at your jaw. I ain't gonna fight." But *I* would. I got in a lot of trouble fighting at school; I wasn't supposed to fight.

Anyhow, this was our town. In there where the highway goes through—by the Mizpah Hotel and the bank—they used to build a big frame on the Fourth of July and have the drilling contest on the platform. The kids would get up there, and they'd put gloves on us, and we'd fight. I was doing pretty good. I think I was twelve; I got a twelve, thirteen, fourteen, fifteen, and a sixteen-year-old kid, and I wasn't doing too good against the sixteen-year-old kid. [laughter] But anyhow, we called it a draw. My dad came up the steps at that time and spanked me—right down there on Main Street, in front of all the public, and he says, "I told you not to fight."

I said, "I'm not fighting. I'm boxing."

He didn't want me to fight; he didn't like that. Now, my mother, she was a little different; she said, "You stand up on your own feet."

So they didn't agree on that, did they?

Well, no, but I had the best mom and dad in the world, I'm telling you. I really did.

So you went to high school here, and you played basketball. Tell me about that.

Well, the first year I couldn't play; I had a bad knee. I hurt my knee, and it was never supposed to bend again. My mom tied me on the bed, and she'd get that leg, and she'd bend it. Finally, it got to work for a little bit, but it's pretty good now. Only thing is, it slips out of gear coming down a mountain.

We had a good basketball team. Up to that time, Tonopah played more for a state championship than any other team in the state. We didn't win them, though; I think we won four or five times ahead of me. Like

McCracken [Robert McCracken, author of *History of Tonopah*.] said, "They must have the best basketball team that Tonopah ever had."

I said, "No, I don't think so. Tonopah had just as good teams before us, and I hope they have just as good teams after." I said, "We were in the right place at the right time." I have a book put out by a tennis shoe outfit that has all the teams that played in Chicago that year. We didn't do very well, because in the West we had different rules than they have in the Middle West. As long as we went to school, and we were under twenty-one, we could play basketball, but back East, as long as they went to school, they could play basketball in high school, because during the summer months and early spring, they were out of school helping on the farms and the ranches.

So some of them were older?

Oh, there was one guy—he was grand. Whenever they wanted a basket, they'd dribble the ball up close to their basket and throw it back to him. He'd just throw it, turn around, and start walking away. He knew it was going in. He was really good.

So you played all around the state, then, to win that championship that year?

Oh, yes. We used to play Goldfield, but that was the second team. We played in Las Vegas; they weren't much. Tonopah was bigger than Las Vegas then. We played Overton, Hawthorne, Yerington, Reno, Carson. One year we played Elko. We played Winnemucca a couple times. We played Bishop. Anybody that wanted to play, we'd play. We had a good team, and they were good boys. None of them drank, none of them smoked, and all were in good shape. We all got along well together. We had a good girls' team, too. We had some dandies playing, but they won some championships, too.

I had lots of jobs going through high school. One of the best ones you could get was with the fire department. They'd take three kids on up through high school and bring them down to the firehouse. The Jim Butler motel is here, and the Mizpah is there up on the hill. That big gray building is where it was, and you'd have to go down to sleep at night. I went down, and we got \$45 a month.

Frank McDonnell was the fire chief, and Mrs. McDonnell would feed us supper and breakfast. That was only half of it; after the dishes were washed, you sat down and got your school books out, and she raised hell with us. You know, the kids who went down to the firehouse and then came back up to school, their grades were better. She was an ex-teacher that had no children. She trained all of us, and boy, she made sure we did it. Well, you couldn't have that job all the time. I had it more often than anybody, I guess, because I could do more things than the other kids. I wasn't bigger than them. I was about in the middle.

Then I had a job with the schoolhouse keeping the furnaces running in the winter-time. They had coal furnaces, big boilers. I didn't shovel the coal; that was Leroy's job. My job was to see that they run properly. When they put them in, I had hung around the school and watched those guys put them in. They sent down to San Francisco for them, and it cost them a couple hundred dollars—that's the fee. I learned, so they put me on it. Yes. That's how I got through school, on the furnaces. Those were two good jobs. At school, you only got thirty dollars a month. Of course, you didn't work all the time, but sometimes you had to work all night to get a furnace working right. I kept them running good.

What did I do during school? Oh, yes. I wrote one book report on *The Virginian*. I don't know who wrote the book, but anyhow, it had more words in the book report than there was in the book. So anyhow, the teacher raised hell with me. You know, I

never wrote another book report. Some girls wrote them for me. They'd write a book report for me, and I'd say, "Now, sign it, 'by Ed Slavin,'" and I'd turn it in. By God, they wrote them. I knew I wasn't going to write another one.

What other crazy things did I do? I got one to tell you. They had a county hospital, and during prohibition the chief of police would call me up at the school or someplace, and he would say, "Send Slavin down. I need him."

I'd take the town car and go to a bootlegger and say, "It's your turn to give the old guys some booze." I'd get a gallon of booze and bring it back to the hospital for the guys, and they had their drinks. I had a little notebook. Yes, I kept track of whose turn it was.

When I got out of school I went to work at Union Oil. I drove a truck. My title was assistant manager. I got a little more than a truck driver, but I drove a truck, too, and that's when I lost my finger. Charlie Wittenburg was back in the picture again. He went from the horses to big trucks. He had big, iron-body ore trucks and was hauling the ore in from Manhattan. They used to buy gas in those fifty-gallon drums, although there's a chine on it. Chines were hoops around barrels that extend about three-fourths of an inch from the barrel. You had to set the chines on top of each other or they wouldn't fit straight across. Well, I got my finger between chines. I never knew the damn thing was gone; didn't feel anything. Mother nature's pretty good to you. When you really get hurt, you don't feel nothing. You break a bone, you don't feel nothing right away. Pretty quick Charlie Hudgens was there, and he said, "Where the hell is all the blood coming from?"

I said, "On you?"

He said, "No, on your hand."

My finger was gone. [laughter] Well, anyhow, I started for the hospital, and D.C. Johnes came along. He worked for the highway, and he put me in his car and started up

to the hospital and ran out of gas, so I had to walk the rest of the way. They sewed it up. I only lost that much. The stitches came through the root of the fingernail, and finally they started growing through little horns out of there. Boy, that hurt, so I went to Reno to St. Mary's. St. Mary's isn't where it is now. You know where it was then? You go in the front door here and look across the street where the sisters live. That was the little hospital in those days. Dr. Starded fixed it. I had to have it cut open; they cut the nerves out of it. Now you can bump it.

After Union Oil I went to work for John Connolly, Verdi Lumber Company, which was right next door. Manhattan was going pretty good, and they were building mills out there—a lot of work to do.

Were you helping build those mills?

No, I was working for the lumber company. The lumber would come in here, and then you'd load it on trucks, and they would haul it out to Manhattan. I just loaded it. John Connolly was a big guy, a good worker, but you never could please that guy, no matter what you did. You unloaded coal in the wintertime, and one thing I'll say about old John Connolly, every Christmas he got a carload of Christmas trees—Tonopah had the railroad at that time—and they were free to the town people. People did things for each other like that.

I got a better job on Thanksgiving, working for Hugh Herd in a men's clothing store. On that job, I wore a suit, a white shirt, and a necktie. I had a haircut once a week, had my shoes shined once a week. I was the highest paid clerk in this town, and that guy was good to me. Of course, when the town went to hell, Mr. Herd sold out and went to Reno.

After that I worked for Ronzoni for a while. They had a big store in Reno and ended up here. I didn't work in Reno; I worked here for Mrs. Ronzoni. We all called her Mom.

Then I went out to Tybo and ran a store for three years. I sold everything but meat. They sold that in the boarding house. Groceries, cigars, cigarettes, gasoline, ice cream, chewing tobacco, clothes—everything in that store.

My wife Helen sewed. If the pants didn't fit these guys just right, she'd fix the cuffs for them. Most of them were miners. The mill men were the worst; everything had to be just right. We did that for quite awhile. I said, "Well, they charge in town for that." They were charging seventy-five cents, and those guys—they'd pay it right now.

There in Tybo we had a lot of foreigners that couldn't write. They could talk with you. I don't know what country they were from. You had four or five from Iowa and some from down around Beatty, some from town here. They couldn't write, but when they left Tybo, they could write their names. Helen would bring them up to the house, and she would teach them to write their name.

So you were married by the time you went to Tybo.

Oh, yes, we married in April of 1928, and by then we had Lucy who was three. Helen was raised on a ranch, and I guess ranch people were a little different than town people. If somebody couldn't do something, they taught them to do it. She was very good. Oh, she was smart, you know. Then we went from Tybo to the Mizpah Mine at Tonopah in 1934 or 1935. The Tonopah Mining Company—that fifty-two miles of drifts and cross cut on that hill up there.

So this was leasing by then?

Yes, it was all leasing. Then we had about ten company employees on the surface. We had a hoist-house stand in there and the blacksmith and a machinist. Well, they were all machinists; they had a special name for them, "chippy doctor." There were about

eight on top, and we had a bookkeeper, Jack Schwinn. We had Mrs. Mullin, who was the secretary for the bookkeeper. H.A. Johnson was in the office for the superintendent, general manager, and I was the foreman. Mrs. Mullin would type for the three of us. Very good—never changed a word—she would put them down the way you gave them to her.

In the post office, I had had one little girl who fixed our type. I'd give her a letter in long hand. She gave it back all typed up properly.

"I didn't write that damn letter," I said, "Where did you get it?"

She said, "It sounds better that way."

I said, "Oh, no you don't. You put down what I got in my letter." Some of them, they try to improve.

Some of the bad parts were the guys getting hurt. You worried about them, you know? You got two hundred men over fifty-two miles. That's a big responsibility. I'd come out about 3:30, check in. They hung their tags up at night.

Anybody who was underground had a tag?

Yes, and they had to hang them up at night. If they didn't, I went after them. If they didn't have it hanging up, I'd charge them a dollar. Pretty quick, they hung them up. If a tag was missing when you'd get up and walk around, your stomach was just in a knot. "Who's going to get it today? Who's going to get it today," and you just felt sick.

Well, I brought Silvio Ciarlantini's daddy out, and he lived. He got his arm split like that with a rock. He was drilling a hole, up like that, and the rock slid down on the steel and cut his arm. I just happened to come along, but Dr. Craig sure gave me hell. I didn't have any bandages, so I took off my undershirt and wrapped his arm in the undershirt and tied it to a fuse and brought him out. Doctor Craig took the underwear off, and he held it up—pretty dirty, you know. I said, "Well, that's all I had."

He says, "You could wash your underwear once in a while." [Laughter]

Well, he lived. Then I brought another one out, Bonny Ornales. He weighed about two hundred pounds. Got him up to the hospital, and the doctor shaved his head. It's bleeding to beat hell. He had a needle. Ever seen those needles made like that, where you put the thread in here?

Oh, the circular needles, yes, for stitching people up?

Yes. Well, he said, "And then you got to sew his head up. I sprained my wrist yesterday."

I'm putting five stitches in him and told him, "I'm sorry I'm hurting you, Bonny."

He said, "God damn you, Ed. It ain't my head that hurts. My foot hurts." Bonny's foot was broke, so I took a razor and was cutting his shoe off—brand new, too. I hated to cut that shoe. I got his shoe off, and about that time the nurse walked in. Oh, was I glad to see somebody.

I went out and sat down in the lobby just waiting for them to get rid of him. I was sitting there waiting my turn. One of the ladies in the restroom walked in, hammered on the door, and said, "Doctor, that man is bleeding to death out there." My head was cut worse than Bonny's! My shoulder was dislocated But we both lived.

There was a lot of them hurt, but I only lost one, Juan Vanegez. He wouldn't listen, or he didn't listen. He was working down below the 500, and he had the ladders coming in. Well, the ladder is supposed to be at a 45-degree angle to rock wall, instead of hanging in underneath a rock jutting out. He had two—one coming down like that. Then he had the other one going like that, and you hung on it to get over to the next one. Well, I raised hell about that.

Any safety feature, I'd scold them about it. Well, anyhow, he was down there, and he broke the law twice that day. His boy was

down in the mine. See, you can walk down in; you don't have to ride. You can walk in if you know where you're going. Well, his boy was down there; he lit fuse down there, under forty-eight feet, and he's coming out, and the boy's story is that he dropped his light, and he went back and got his light. Coming out, the round went off and got him. Come up on top, and I saved him pretty good. Boy, that kid loves me today.

I got up on top, and I went down the stope. When they blast, it makes carbon monoxide gas, and this was in a dead-end. There was no ventilation. The gas and the bad air—that was bad enough, but when you begin mixing a human being with it, it's worse yet. Well, anyhow, you could *smell* a fuse smoldering. Oh, I hollered, "I need some help!"

Well, it was about ten guys up there. They all got ten dollars a shift for this emergency work, and none of them came down. One Mexican fellow, Joe Hernandez, came down, and he took a whiff with his nose, and he pointed at the muck pile.

Well, we worked pretty hard, and of course I got hurt a little bit, but we got Juan out and put him in the basket, and they pulled him out, sent the basket down. The basket came down, and Joe says, "Mr. Slavin, you family."

I says, "Joe, get in there before I crown you."

They got him out, and I got out, and I sat down on the level. We were sitting there at the cross cut to the stope when the soldering fuse exploded. Big boom! Twenty-one minutes it took us to get him out of there. Of course, all the lights went out, and then the pop, pop, pop of carbide light being lit. There were five Mexican boys, all on their knees with the lights lit, praying. I guess they were thanking God for getting me out of there. I never asked. That was the kind of thing that makes a man out of you.

So you got one out, but he didn't survive?

No. The doctor even came down. That old doctor, he was a pretty good old guy—Doctor Craig. Today I bet you couldn't get one of these guys to come down in the mine; wouldn't know what the hell to do. Dr. Craig was coming down there, and I said, "No use coming down. Look at this, they haven't got any air."

He says, "OK. Get him out as fast as you can," but he was dead when we got him on top.

Then the next one came up. It had two stopes on the valley view. They came to split like this. [Indicating the vein split with an incline raise in between to draw good ore from both.] Now, that's 500. On the 600, this Mexican came in there, and he was drawing the stope, the chute, and he thought he was drawing this lane over here, but he wasn't. He was drawing this one.

Because they were parallel?

Yes, and they'd done a chute in between. They timbered between them through this muck. Of course, I had it marked, "Warning, this chute is closed." I came out that night after three o'clock. There I was. Well, of course, I'd lost my light. And dusty—oh, it was awful dusty. But anyhow, I still had my coat; I carried short candles and matches in this pocket, and this arm was buried. I got a candle out and finally got it lit, and I looked. It's not bad, besides about forty-five all loose muck. Turned around and looked in back of me—that loose muck was straight up and down. Well, anyhow, I took my time. I got out. I had to walk about a mile to get to the shaft. I finally got to the shaft, and then I got a carbide lamp there. Each lessee would leave their carbide lamp at the station—200, 300, 400, 500, 600, etc. Some had cleaned them and had them ready for use. Big help to me, thank God. We never used to have those lamps, but when you're coming out at night, boy. Well, I got a carbide lamp and what was left of the candle. I looked until I

got one light. Everybody was taken care of. I had a full carbide, water, ready to go. Well, I walked out. I got out about 7:30 a.m. My arm was a mess. They didn't call it a break. I don't know what they call them—next to a break. My foot was on the bum; it was cut again. My face was supposed to be crushed—I don't know which side. They brought me to the doctor. I was in the hospital a week or ten days, and I had to get out, because things had to be done. I didn't go underground, though. In the office, I had to get things done. You know something? I *never* went back to that damn place.

You never went down the mine after that?

It scared me. Four times. I figured, boy, three times you were lucky. Four times, you should have gone. I sit here and look at it. I can thumb my nose at it now.

Because you can sit right here in your house and look across and see it.

Yes. Oh, I look at it. I can see a lot of places down there.

Well, then I went to work for Wolfe's in a hardware store. I'd worked off and on as—not as a clerk, mostly as a maintenance and repair man. That's a big store. I put hardwood floors in it and moved showcases, and that's still the way it is today.

Then I ended up running for county commissioner and got elected in 1946. I was up there three months, and the politicians with the power to lead came up and said, "Ed, you'd better quit. Take that job in the post office." They didn't like what I was doing. Boy, I'd have a fit if I was up there today—the way they throw money around. These guys get \$40,000 a year as commissioners. You know what I got? Seventy-five dollars a month. If I got \$40,000, I'd probably be there still.

Anyhow, I took the post office job. The Democratic Central Committee recom-

mended me, and Pat McCarran had the dishing out of it. It was a first class office at that time. You know, I had a meeting with him, and we talked about it. I had run the post office at Tybo for about three years, and he accepted that and said, "Ed, I want to tell you something. Don't you ever lie to me."

"OK, Pat, what the hell's the use in lying to you? You'd find out anyhow." I got it.

Well, I'm glad I got it, but Helen didn't want it. She wanted me to stay in politics, and I'm putting a meeting on today. There were some times in there it seemed like I always cleaned up messes. The guy that was in there before me, was an old man. He didn't give a damn. Well, he wasn't even there. He'd go down by Beatty to this hot springs down there, Tecopa Hot Springs, and stay down there and then come up here and get his check and go back.

Mrs. Malone would really run the place. Nice lady. I don't think I was there three months, and I got a letter from the postmaster general wanting to know why the hell I hadn't answered his letter of a certain date on the postal savings account, which I would balance, so they said. I worked eighteen months on that damn thing, and I worked probably six hours at night on my own time. I got it all figured out, and it was fifty-two dollars over.

Of course, I knew a lot of these people. I had one guy by the name of George Sopp who had \$840 in there. Well, I wrote him a letter. He said, "Yes, I had some postal savings in Tonopah, but I don't know whether I drew it out in cash or not."

Well, the clerk in charge at that time—this is twenty years—had transferred it to Manhattan and never made an entry in the book. They were carrying that over, and it was covering up some that were short. Well, I got that straightened out. Then I had a row with the post office inspectors, and they said, "You'd better do this, and we can do that, and we can do this." They came in the post office to audit, and then they went over to

the drop where you put your letters in, and they just started handling the mail.

I said, "You can't touch that mail. You're not in this office. Leave it alone."

They said, "We're just looking. We want to find an address."

Well, they found the address, and they said, "Gee, I'd like to open this."

I said, "You're not gonna open no mail in this office."

You know, we had a little trouble then, but they are not allowed to do that. Postmaster can't.

Oh, I got to tell you some stories, all right? One day this lady knocked on the door. Oh, she was boiling over. My hell. She called me some fancy names and threw the letter down. She said, "You opened that letter, didn't you?"

"Well, maybe I did, but I didn't read it yet." So I took the letter out, and I started to read it. [laughter] I said, "I'm sorry, but I'll read it when I got time and answer it."

About that time there was a little knock on the door. Her daughter came in and said, "Mom, I opened it." [laughter] But you get accused of things like that.

We used to handle lots of money. Now the post office doesn't handle it. They got armored trucks handling all the money now. You see them running up and down the street. They used to ship it in by mail; the post office handled all the money for the bank.

One Fourth of July we had a shipment come in, and, of course, the sacks were all labeled. I mean, you can tell what's in them. Those things are heavy. But then one comes with the registered mail. You open that, and you take out the bill of lading in there. They called for eighteen sacks of silver dollars, and we had nine out there. Now, I called the driver in, and I said, "Now, I want you to sign this paper. There were only nine, and these are the number that you delivered today."

And he said, "OK."

Then I said, "Now, we're going out, and we're going through your truck."

We went out, and, of course, there was a lot of mail left. We took every piece of mail out of that truck. No more money. So I call the inspectors in Reno. I got them at about 8:15 in the morning.

"How do you know you're short?"

I said, "Well, I got the bill of lading here for them. I only got nine sacks, and it says eighteen. It's reasonable to believe they're short. Why don't you check the Reno office and see what the hell's going on."

You know, as long as I know, they never found those nine sacks of silver dollars, and if I hadn't been so careful, they'd have thrown me and all my crew in jail. Who stole it? Yes. Oh, they try to pin things on you, those inspectors. Anyway, they get themselves in the clear and get their work done. Boy, I didn't get along with some of them.

I want to go back a little bit to some of the sketches you showed me [see following illustrations]. Did you teach classes from this?

Yes. Well, I wasn't a teacher. I would just visit and talk. Here's the shaft. [See Figure A] The shaft was down here, and there's all these caves. The surface will cave, because there's surface rock. When you go through some places, it's all fractured, and you get down so far, and it's no longer fractured. Well, this all falls down. Of course, the timber falls out and everything. In this particular case, the person that caused this to fall in walked over it.

I said, "Think what you've done. You are not here to look down a hole." You can't see nothing, only get in the way. Look, if I'm looking in a hole, I'll stand way back there, and I'll look at this side. If this side is caved in a little bit, I don't go there. I might look around, and if it's solid, I might walk up to see if there's tracks, but you can't see if there's anybody down there.

Well, this fell out, and these guys got caught in between here, and this was open. This place is open now, and most of this has fallen through down here. Well, he took this culvert—like those used on highways to

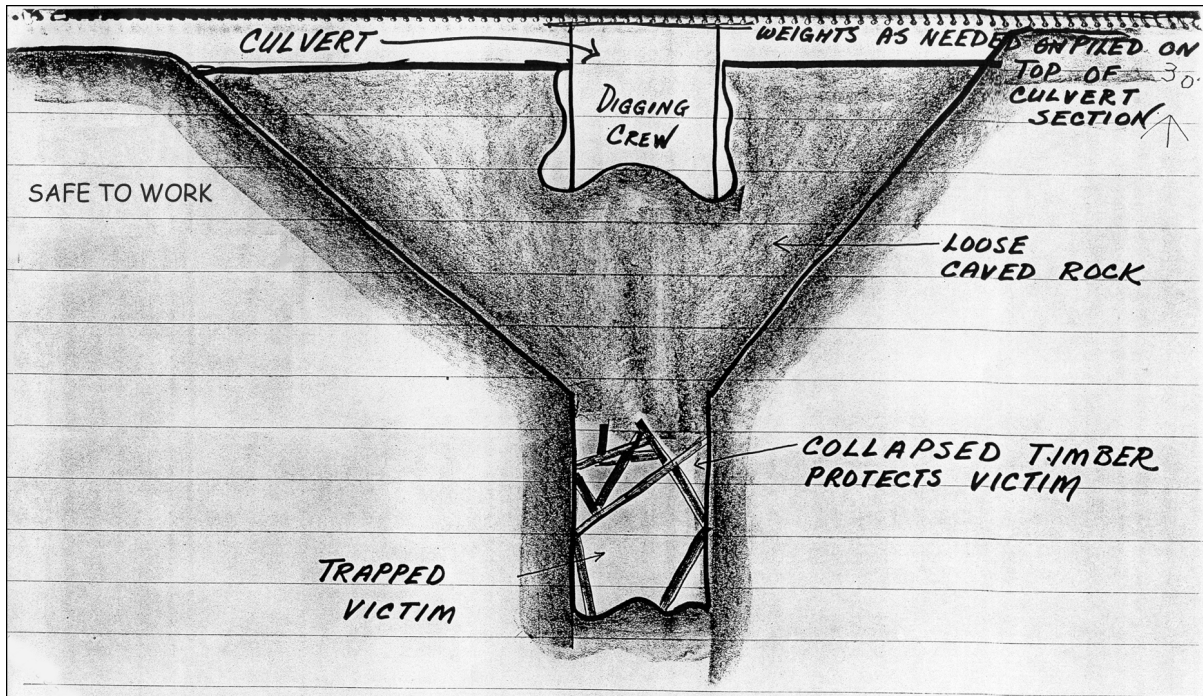


Figure A

carry water under the road—into the hole, and he stuck it up like that, and now he's got inside, and he starts digging loose. He was going to dig this culvert going down. He got down to here, and he started getting these out. Well, when you got here, you had to be careful, because if this was a bigger hole than that, it'd break through, and the guy would go down there, and you'd lose him.

So these charts were basically to show examples of cases where there had been trapped victims and how it worked and how to keep it from happening again?

Yes. Well, this one is on the air. [See Figure B] You're coming in here. Normal air. All right. Here's the invisible, and you can't see the shafts in the mine. You're walking in here.

And all of a sudden you hit bad air?

You hit bad air. All right, when you're walking in here, there's a little pressure. Your body's pushing. Goes up there and pushes that bad air back, in back of you. Well, I get ready to turn around and come back out.

You're breathing that bad air. I see.

You got to know about these things. They make a "mechanical canary." You see, in England, they used to use canaries in the mines in the early days to test for bad air. Well, this here squeezed the bulb, and it sucked the air in and pushed out. There were three chemicals: purple, gray, and lighter. The light one you could stand. The gray one was bad, and the purple one you had to get out. I used to have one, but somebody borrowed it.

This chart shows the way the ladders were coming up and the air circles up here. [See Figure C] It can have a downdraft, and the air is good, but if you have an updraft that's all caused by the temperature underground. If you've got hot air, the hot air will push it up in the daytime. It makes a difference. I got one in here on that. [See Figure D]

This is how the air circulates?

And this is on the surface now. You can walk in here. You can go in there and down here.

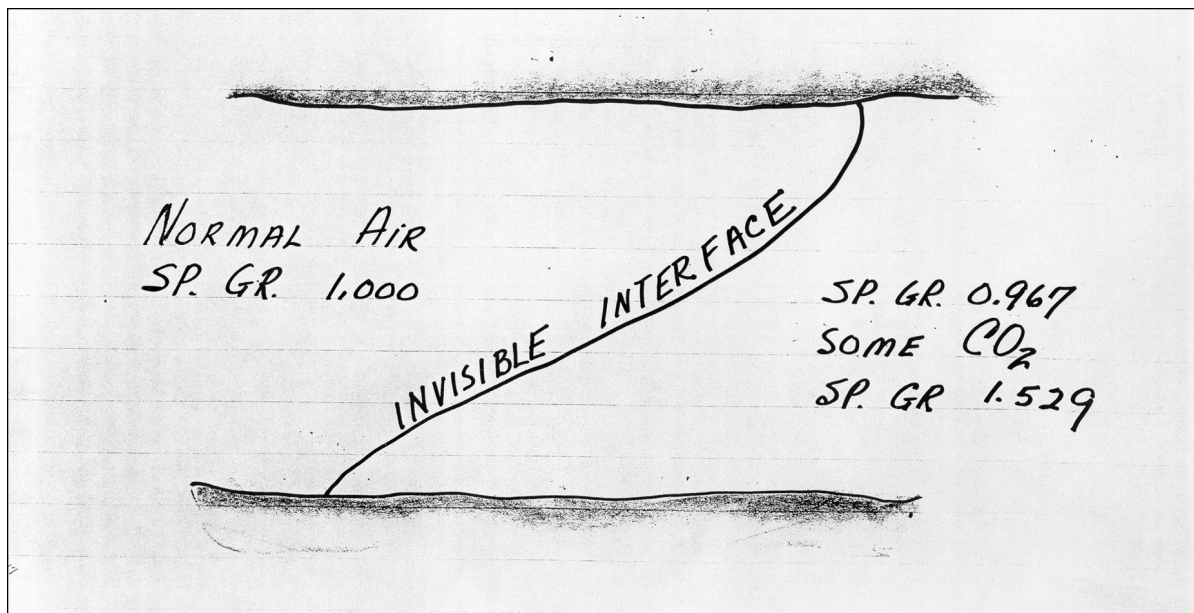


Figure B

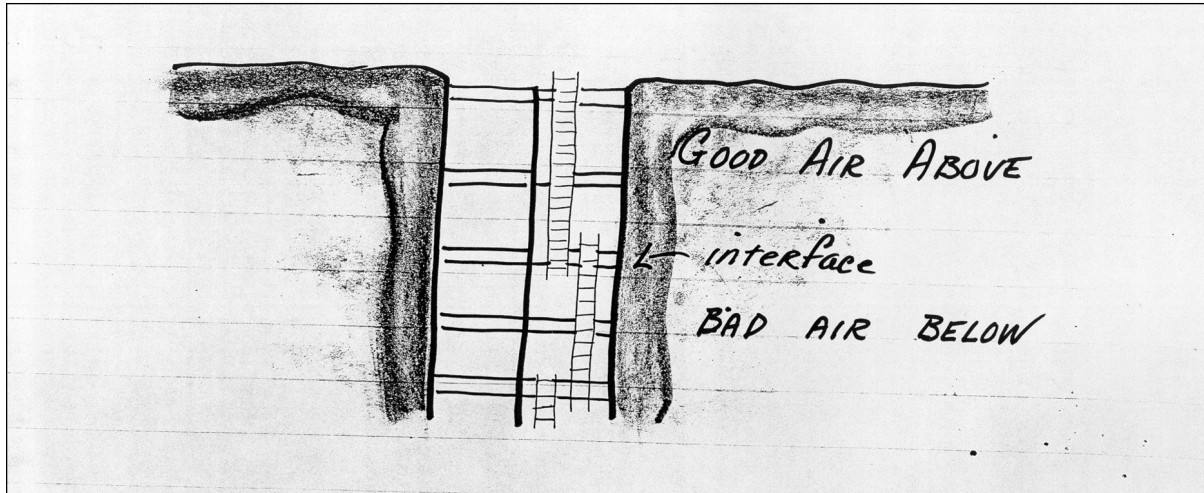


Figure C

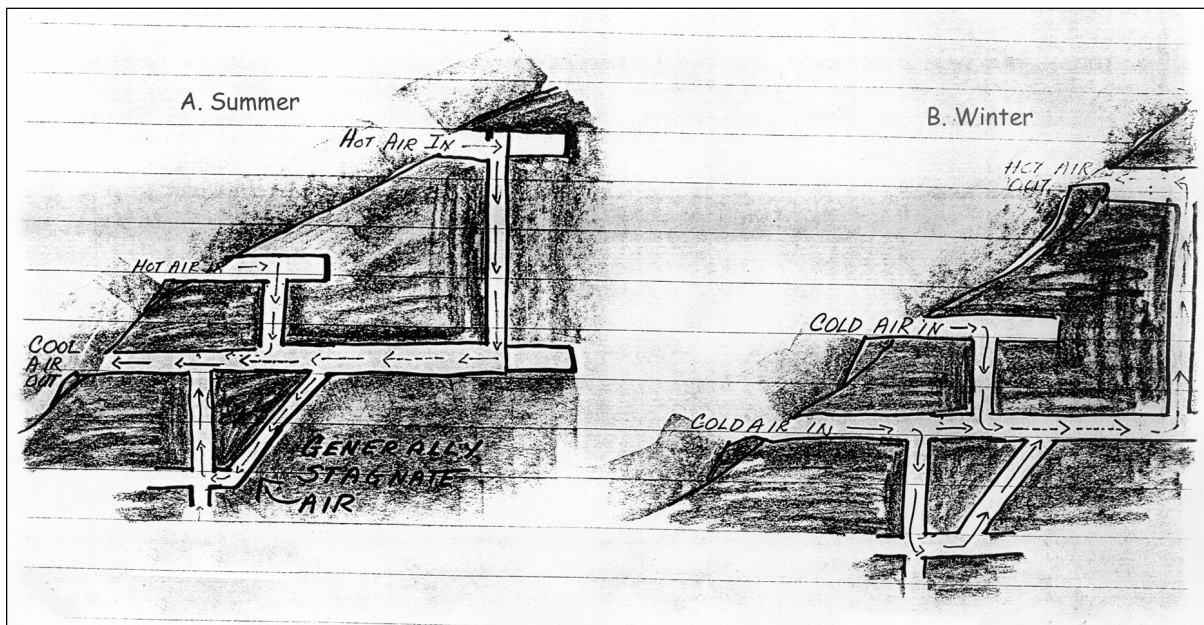


Figure D

So hot air comes in.

Yes. When the day is warm, the hot air comes in and goes down here, and this pushes the cool air out. Well, down here now there's nothing pushing the air out, so the bad air gets here, and this holds it down. You got to know what you're doing. Have you ever had a chance to see a moving picture where the guy's walking on the bottom of the ocean, and that fine sand comes up?

That's how it pushes the air back?

The dust down in the mine, the same way. There's places up there on the 600 going from the Mizpah. The Mizpah comes out this way and goes to the Belmont that way, and the air is in back of you. You can go over to it.

But you can't turn around and go back.

Because the bad air is coming up at you. This is what they call "spiling." This ground caved in. [See Figure E] We used mostly square timber, not round. This comes up through here, and this is a crosspiece. It goes across it just like that. Notice they're pointed? When they're all driven up, see how they're driven up?

Yes, up at an angle?

Yes, and as you take this ore out, this moves it down and tightens it. It'll set it in there tight. It costs money, and it's hard work.

This is pouring in here to get out when you mix the solution and drive this post in here. [See Figure F] Guys are spiling out here, put this up there, and you didn't have to come clear to get it, because it was a big rock. It was holding it.

So the spiling was something that you used to get in to get people out, or was it also something you used just as you were working?

We used it to hold the workings open.

So it was used all the time.

You look at this; this was a bad place. [See Figure G] Anything over here, you fill that in with anything to hold it. It sets down so that you can get in to the victims in here, and then, generally, it's the only way to get them in. He didn't get out of there. It generally comes in.

One of the first runs I was on up here was on the 400. This Greek was working with a miner named Ernie Valasquez. The Greek was putting the money up. Valasquez didn't come to work one day. Well, this guy got in there. This is where you get out—going back

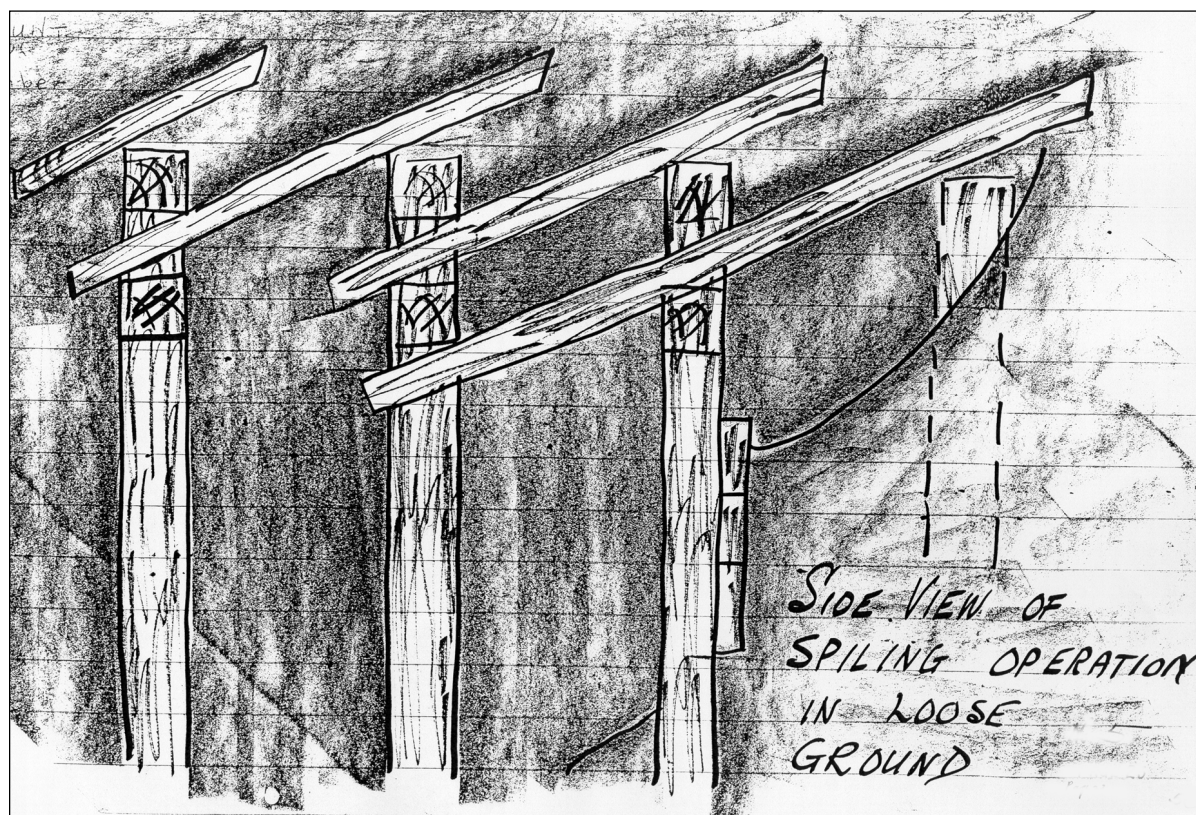


Figure E

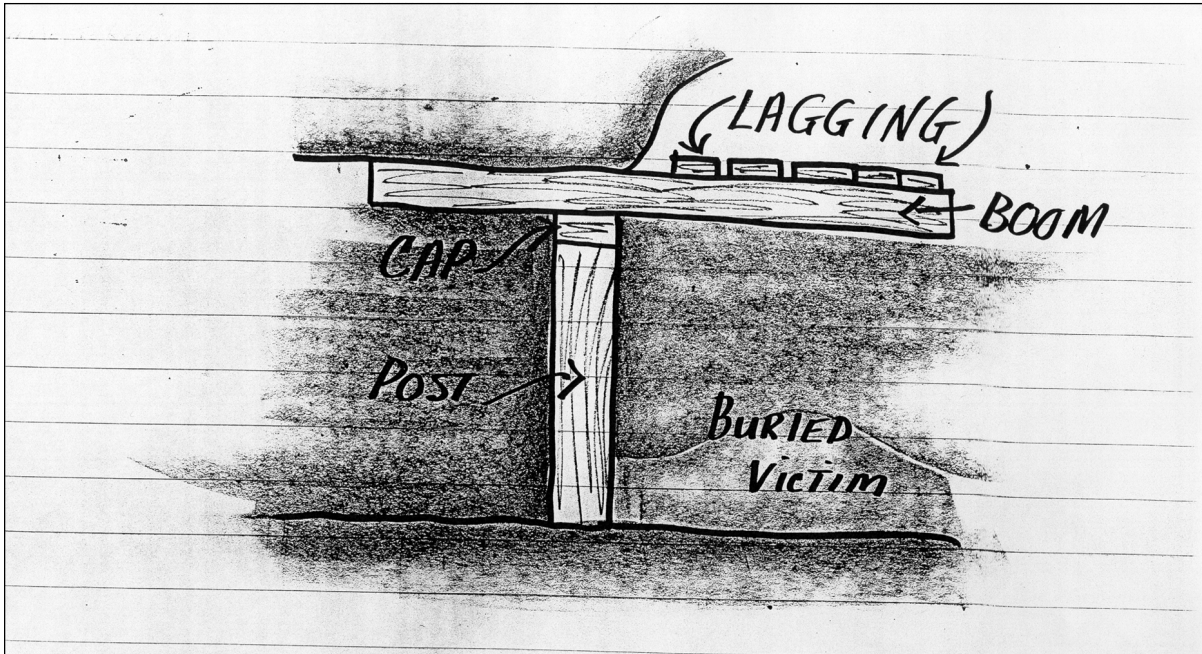


Figure F

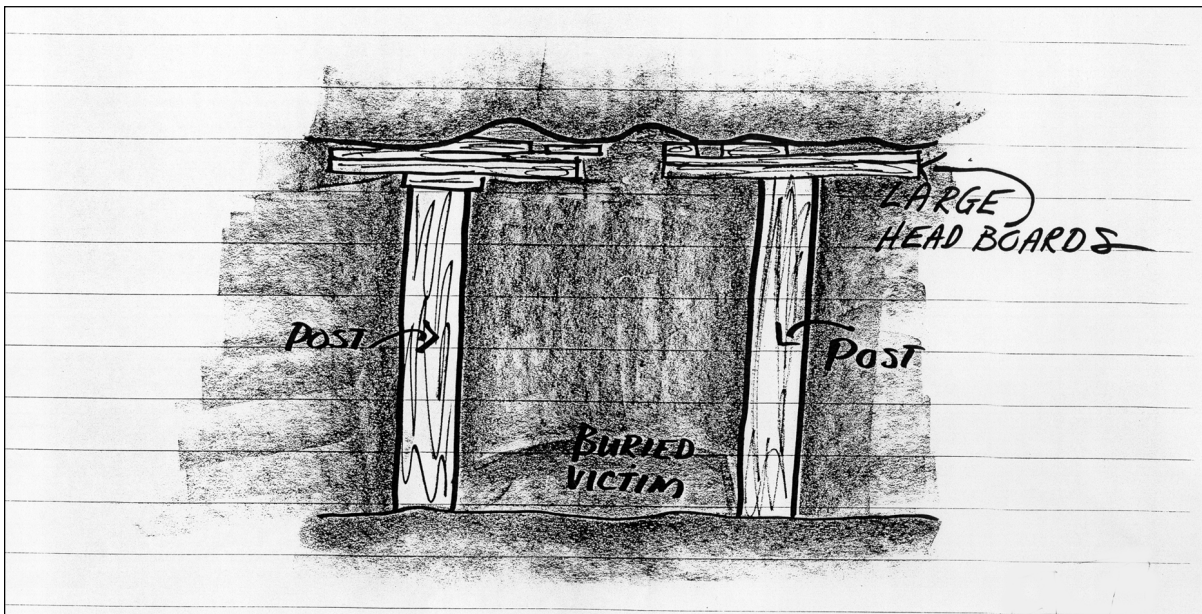


Figure G

in there and poking to get the ore out. Instead of going way back out here, he started poking in here and got himself caught. It took us five hours to get him out. He didn't stay in town. He got on a bus and went out of town real fast.

He didn't want to do that again?

No. Now this is natural. [See Figure H] These are mostly crosscuts, because, if it was a drift, then they'd mine the ore out. This sloughs.

The top of the arch sloughs down.

Right, and it piles up here and keeps on, then, piling up. See this is clear up full? Then the water gets trapped in the back of it. OK, we go over that, and we figure, "Well, the water's that deep," but you know what you got to do? You got to have a stick to see if there's a hole there, because you can drop down. Well, this shows the way they always caved. [See Figure I] They always caved, maybe a little more.

But usually at a forty-five degree angle?

Yes. Well, this shows where the timber rots. [See Figure J] It'll rot close up to the

rock, because that's where moisture forms. If it's out where the air is, it doesn't rot. Then another thing is, some of this timber is full of bugs. You get down in the mine at a certain temperature; if it's moist, then you got to move to get that timber out.

So you have to watch to make sure there's no rock.

You got to watch, yes. These are stopes. [See Figure K] Now, the main, they say, would be six feet wide. They put those in, and they cut a hitch. This is a wall here, and they cut a hitch out like that, so you can put the timber in and drive wedges just to hold them tight. Then I put their lagging on top of those, and they drove around it and blasted it.

And the lagging is another timber?

Yes, and it's two by twelve and bought in various lengths. Well, it goes down to six inches wide. This is still holding. [See Figure L] This is caved in, and this is caving in here.

And you've got timbers down either side of this.



Figure H

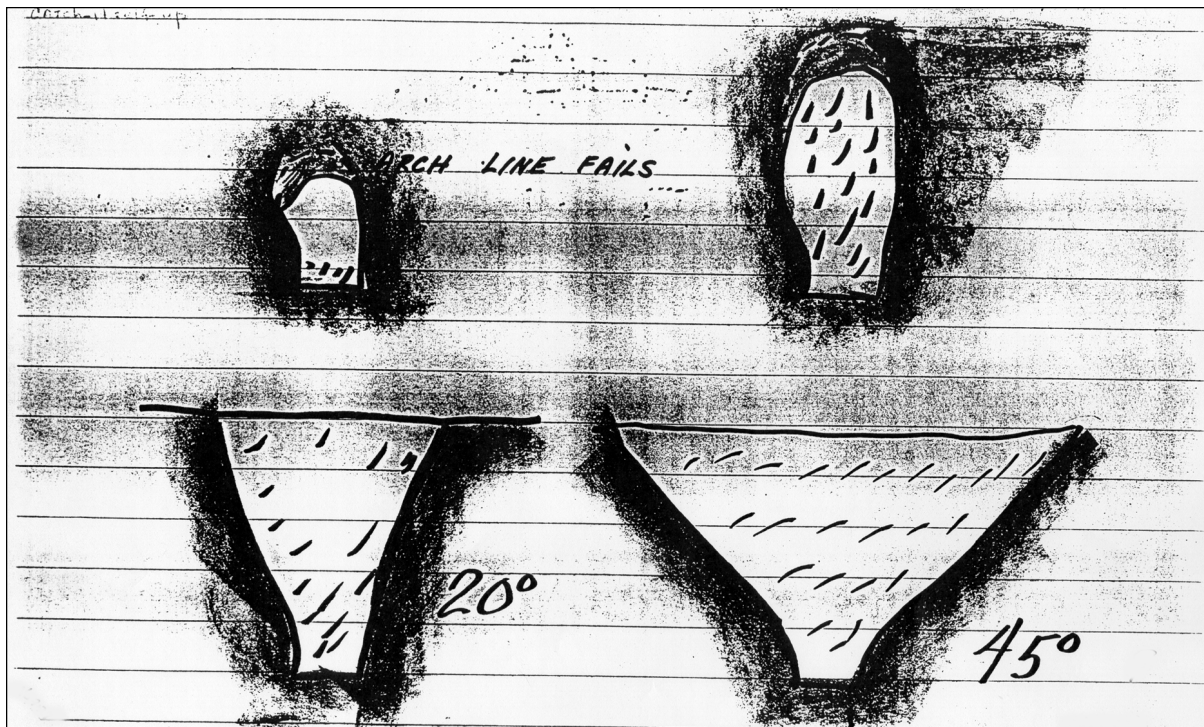


Figure I

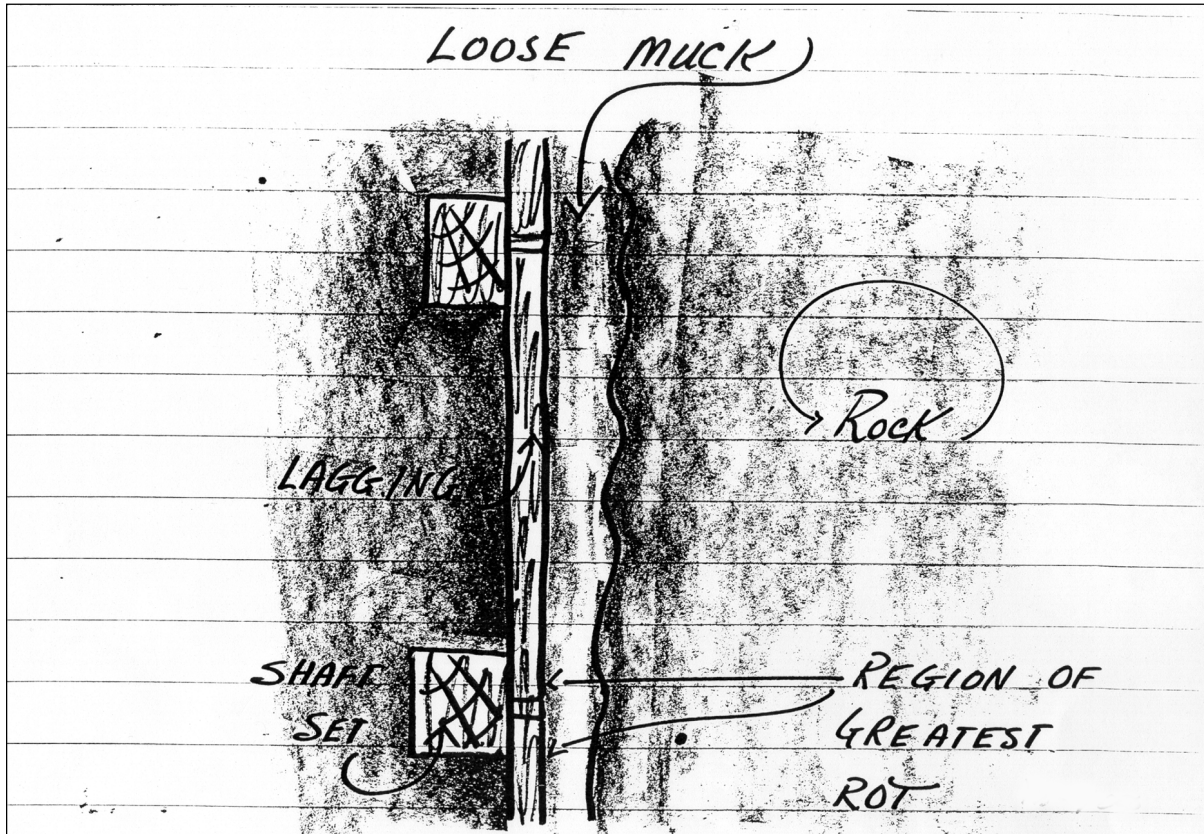


Figure J

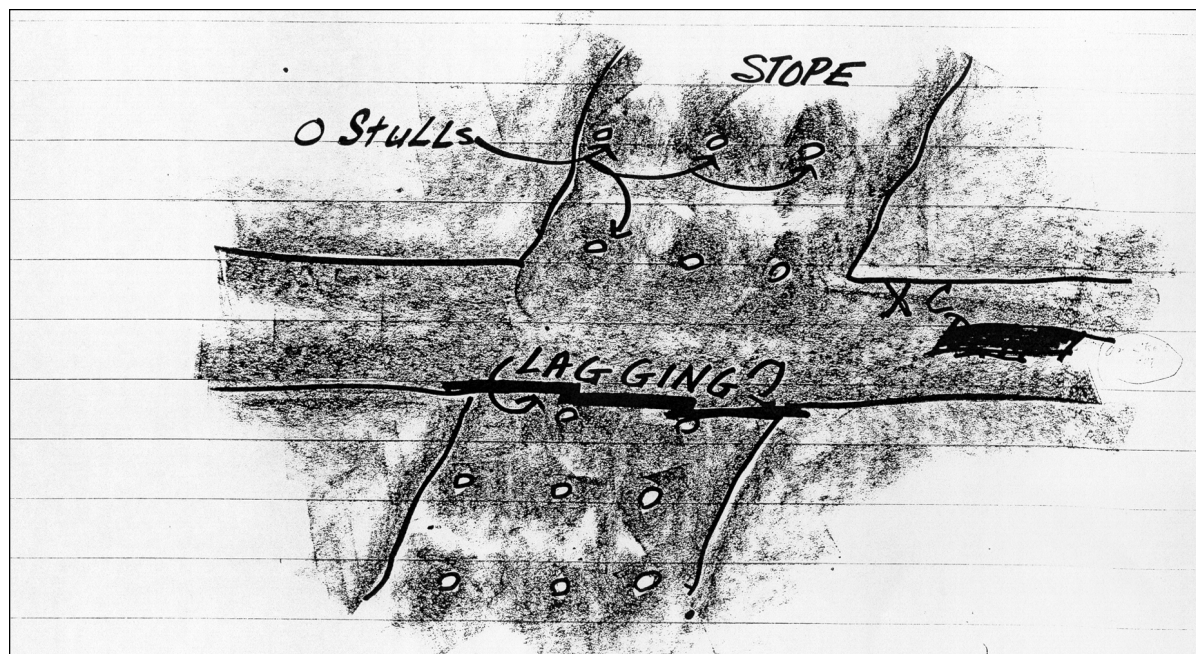


Figure K

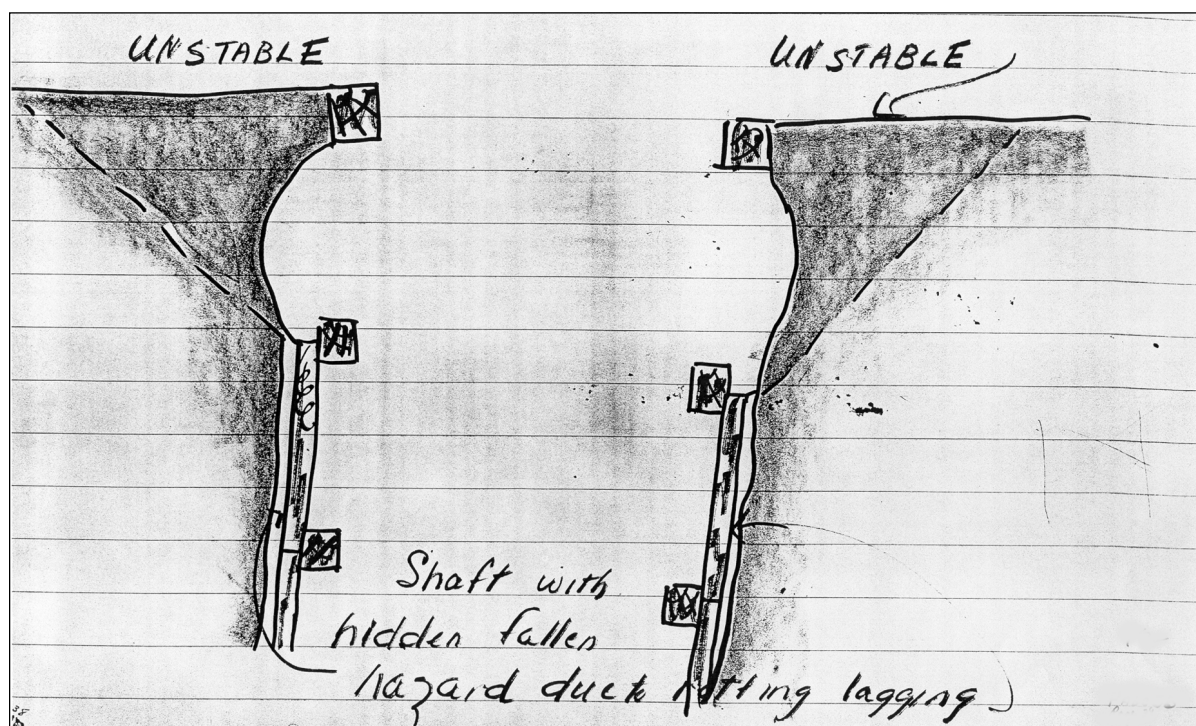


Figure L

Yes, well that was the shaft, and the lagging is come off here, OK, down below some place. This gradually keeps working out, but what is hanging up here, you see, around the collar of the shaft, when they were working up close to it, there was mud, and they got in there and got it packed tight, and it held up better than the loose ground. This is what's happening here. [See Figure M]

Yes. This is an old chute.

This is closed off here, and this was a hole here and filled there, and here's this new track up here, and you walk along there and zoom.

Fall into the old chute, yes.

Yes.

So you had to know where all of those were.

Well, you tried to know.

We're going to go back a little bit and talk about your first underground experience at Tybo.

Well, I wasn't working for the company. A guy by the name of Bradley was running

the mine at Tybo. I was working for Sanford Galvin, George Southwood, and Ray Fleming—running the store. It was called the Commissary. We sold everything but meat in there. We used to have things of interest. We used to have a pool every night. Guys would sit down, and they'd put up two bits, four bits, or six bits, and guess how many mice we were going to catch in an hour. It was overrun with them. We did that for quite a while, and we got the mice all cleaned up.

On the Fourth of July they closed the mine down, except for some repair work that had to go on. Of course, the mill had to keep running, and they had to keep the pump man on. I was in the store, and here it was his first shift, and he was working with Donny Mulligan on the 400. Tybo is lead ore, and it's dirty, black, filthy, and slippery. Well, they were hitching this ore chute in some way, and he slipped and fell down. He went down over fifty feet, because I went down. We went out and had them blow the whistle. Three blasts was an emergency. We blew the whistle so hard that the owner looked out, and about that time, Abe Jutilia, the foreman for the Yukon, came over to the store, and he says, "Ed, we got a man hurt, and I haven't got anybody else I can put down there with Mulligan. You come and help me."

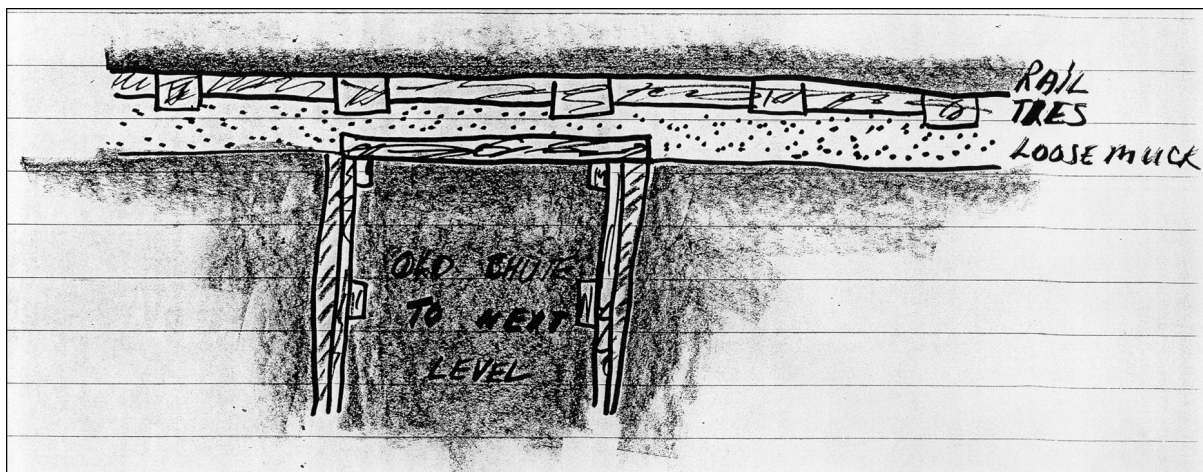


Figure M

So I said, "Yes." I went down and got him out. Not that easy—it's easy to talk about. We brought him over to the nurse's quarters. Mrs. Walter Ball was a registered nurse, and she was on duty. It was fixed up like a little hospital. We lifted him out of the basket, and I had his head, and the other guy grabbed him and whisked him out and set him on the table. Mrs. Ball says, "His arm's broke. I'll fix his arm up."

I said, "Mrs. Ball, look at my hand." Brains! I washed them off. Kept blowing the whistle, and Jimmy Foster, one of the truck drivers, got in, and we had him wrapped up in a couple of blankets and in the basket. I tied them in the back of the pickup, and I said, "Jim, he's dead already."

And he says, "Well, I'm going as fast as I can."

Jim Foster got him in to Doctor Craig, and he was dead. As time went by, his widow sued the Yukon on the death of her husband. Well, the Nevada Industrial Commission was paying injury, and they were supposed to pay. Well, they said no, because there was no authorized personnel down there removing him from the hole. They had the inspector here, and I had my little card that says I'm a Yukon employee. He looked at it, and he says, "Is that you?"

I said, "Yes, that's me." I said, "It says right there. Index finger off my right hand. Nobody else cuts them off just to . . ." I tell you, Yukon didn't have to pay that \$10,000. Nevada Industrial Commission had to pay it, but you see how they tried to wiggle out? They were paying insurance for men underground, and if an emergency comes up, you can't always have somebody that has the answers. Sometimes an emergency comes up, and you got to take what you got.

That's what happened in that airplane crash. Well, I didn't know anything about an airplane. I learned where the batteries

were. That's the first thing you cut out of an airplane. You ever get near an airplane that's crashed up? Smell is just all-around gasoline.

Take the batteries out, do you?

If the shorts went out in back, the whole thing comes off. I might have the book. I have one little book with as many pointers as I could find and the picture drawn where the battery was. I bought myself a little metal saw to saw aluminum without a spark. I didn't want to get blown up, either. We saved three doctors' lives and one nurse's life, because they couldn't walk, and they were on top of this mountain down by Lida. That son-of-a-bitch was going to sue me. I didn't like stretchers. I like those baskets. You know what I'm talking about? Navy baskets. Sure it was rough. The hill—there was no road in that little detour. So you know what I did? I stopped the car, and I said, "Here is the key. Get up out of that basket and drive it yourself."

Well, he didn't sign it. We never used to make them sign papers. Of course, we had the American Red Cross in back of us. We all had that training. Sometimes I wonder if I have good sense.

Well, you certainly have done your share of rescuing, haven't you? [laughter]

Well, yes.

With mines and airplanes.

And cars, too. You know, people can be awful careless sometimes. Now, don't you drive fast on slick roads.

No, I won't.

GLOSSARY

All definitions are from *The Glossary of Geology* (Falls Church, VA: American Geological Institute, 1980) or from Stanley Paher's *Nevada Ghost Towns and Mining Camps* (San Diego, CA: Howell-North Books, 1970).

adit, *n.* A horizontal passage from the surface into a mine, sometimes called a tunnel.

alluvial, *adj.* Deposited by a stream or running water.

amalgam, *n.* A naturally occurring alloy of silver with mercury; a general term for alloys of mercury with one or more of the well-known metals, especially an alloy of mercury with gold, containing 40 to 60 percent gold, and obtained from the plates in a mill treating gold ore.

arrastra, *n.* Large, bowl-shaped devices in which Hispanic miners ground ore with the aid of slow-circling mules.³

assay, *v.* To analyze the proportions of metals in an ore; to test an ore or mineral for composition, purity, weight, or other properties of commercial interest.

backwall, *n.* Headwall or a steep slope at the head of a valley.

ball mill, *n.* A rotating horizontal cylinder with a diameter almost equal to the length supported by a frame or shaft in which materials are ground using grinding media such as iron or steel balls.

barite, *n.* A white, yellow, or colorless orthorhombic mineral. Strontium and calcium are often present. Barite occurs in tabular crystals, in granular form, or in compact masses resembling marble, and it has a specific gravity of 4.5. It is used in paint, drilling mud, and as a filler for paper and textiles, and is the principal ore of barium.

bonanza, *n.* A miner's term for a rich body of ore or a rich part of a deposit; a mine is "in bonanza" when it is operating profitably.

collar, *n.* The mouth or upper end of a mine shaft.

concentrates, *n.* The valuable fraction of an ore that is left after worthless material is removed in processing.

crosscut, *n.* A small passageway that may be driven at an angle to the main entry of a mine to connect it with a parallel entry or an air course. A level driven across the course of a vein or across the general direction of the workings; thus a mine opening that intersects a vein or ore-bearing structure at an angle.

cut and fill, *n.* The excavating of material in one place and the depositing of it as compacted fill in an adjacent place, as in stope mining.

cyanide process, *n.* A process for the extraction of gold from finely crushed ores, concentrates, and tailings by means of cyanide potassium. The gold is dissolved by the solution and subsequently deposited upon metallic zinc or by other means.

district, *n.* In the states and territories west of the Missouri (prior to 1880), a vaguely bounded and temporary division and organization made by the inhabitants of a mining region.

drift, *n.* A horizontal or nearly horizontal underground opening driven along a vein.

fault, *n.* A fracture or a zone of fractures along which there has been displacement of the sides relative to one another parallel to the fracture.

float, *n.* A general term for isolated, displaced fragments of a rock, especially on a hillside below an outcropping ledge or vein.

flotation, *n.* The method of mineral separation in which a froth created in water by a variety of reagents floats some finely crushed minerals, whereas other minerals sink.

fluorspar, *n.* Fluorite. A transparent to translucent mineral found in many different colors which has a hardness of 4 on the Mohs scale. It occurs in veins, usually as a gangue mineral associated with lead, tin, and zinc ores and is used as a flux, in the preparation of glass and enamel.

footwall, *n.* The underlying side of a fault, orebody, or mine working; especially the wall rock beneath an inclined vein or fault.

flux, *n.* A substance that promotes the fusing of minerals or metals or prevents the formation of oxides.

gallows frame, *n.* The frame supporting a pulley over which the hoisting rope passes.

gangue, *n.* The valueless rock or mineral aggregates in an ore; that part of an ore that is not economically desirable but cannot be avoided in mining. It is separated from the ore minerals during concentration.

hanging wall, *n.* The overlying side of an orebody, fault, or mine working; especially the wall rock above an inclined vein or fault.

headframe, *n.* The steel or timber frame at the top of a shaft, which carries the sheave or pulley for the hoisting rope, and serves various other purposes.

high-grade, *adj.* Said of an ore with a relatively high ore-mineral content

high-grading, *n.* Larceny of valuable ore or mineral specimens by employees in a mine.

jewelry rock, *n.* Rich ore.

lagging, *n.* Heavy planks or timbers used to support the roof of a mine, or for the floors of working places and for the accumulation of rock and earth in a stope.

leaching, *n.* The extraction of soluble metals or salts from an ore by means of slowly percolating solutions; e.g. the separation of gold by treatment with a cyanide solution.

lens, *n.* A geologic deposit bounded by converging surfaces (at least one of which is curved), thick in the middle and thinning out toward the edges, resembling a convex lens.

level, *n.* Mines are customarily worked from shafts through horizontal passages or drifts called levels. These are commonly spaced at regular intervals in depth and are either numbered from the surface in regular order or designated by their actual elevation below the top of the shaft.

lifters, *n.* Refers to a set of holes drilled for dynamite blasting in a mine which, when exploded, lifts the rock.

muck, *v.* To load broken rock by hand or machine and remove it following a blast.

ore shoot, *n.* A large and usually rich aggregation of mineral in a vein.

overburden, *n.* Barren rock material, either loose or consolidated, overlying a mineral deposit.

patent, *n.* A document which conveys title to the ground, and no further assessment work needs to be done.

perlite, *n.* A volcanic glass having the composition of rhyolite, a perlitic texture, and a generally higher water content than obsidian.

pillar, *n.* A term used in the southwest United States for a large pillarlike or projecting rock.

porphyry, n. An igneous rock of any composition that contains phenocrysts in a fine-grained groundmass; a porphyritic igneous rock.

pulp, n. A mixture of ground ore and water capable of flowing through suitably graded channels as a fluid.

raise, n. A mine shaft driven upward from a lower to a higher level.

run, n. A flat irregular ribbonlike orebody following the stratification of the host rock.

scheelite, n. A yellow-white or brown tetragonal mineral associated with quartz, it is an ore of tungsten.

skip, n. A large hoisting bucket which slides between guides in a shaft, the bail usually connecting at or near the bottom of the bucket so that it may be automatically dumped at the surface. An open iron vehicle or car on four wheels running on rails and used especially on inclines or in inclined shafts.

skip tender, n. The person who operated the skip.

slimes, n. Ore reduced to a very fine powder and held in suspension in water so as to form a kind of thin ore mud.

slurry, n. A highly fluid mixture of water and finely divided material.

square set, n. A set of timbers composed of cap, girt, and post. These members meet to form a solid 90 degree angle. They are so framed at the intersection as to form a compression joint, and join with three other similar sets. This system of timbering can be adapted to large or irregular ore bodies.

stamp mill, n. An apparatus in which rock is crushed by descending pestles or stamps operated by water, steam, or electric power. Also, the building containing the machinery.

stope, n. An underground excavation formed by the extraction of ore.

stringer, n. A mineral veinlet or filament, usually one of a number, occurring in a discontinuous subparallel pattern in host rock.

sump, n. A pool of water in a cave, the outlet of which lies beneath its surface.

tailings, n. Those portions of washed or milled ore that are regarded as too poor to be treated further, as distinguished from the concentrates or material of value.

tunnel, n. Strictly speaking, a passage in a mine that is open to the surface at both ends. It is often used loosely as a synonym for adit or drift.

vein, *n.* A zone or belt of mineralized rock lying within boundaries clearly separating it from neighboring rock.

whim, *n.* A large capstan or vertical drum turned by horsepower for raising ore from a mine.

winze, *n.* A subsidiary shaft which starts underground. It is usually a connection between two levels.

INDEX

A

- A. O. Smith Corporation (Round Mountain, Nevada), 51, 53, 66, 69
Acord, Art, 14
Adelaide Crown Mine (Nevada), 211-217, 228, 233, 235
Adir, Bill, 13-14
Africa, 95-96, 122-124, 131
Alaska, 56, 59-60, 155, 251, 369, 613
Albany, Oregon, 370, 386
Albany Station (U.S. Bureau of Mines), 241, 244, 386
Alberta, Canada, 419
Alberta Tar Sands (Canada), 423
Ali, Muhammad, 129
Allen, Guy, 412
Alligator Ridge Mine (Nevada), 185-186, 200, 559
Allison, Ed, 373-374
Alta Formation (Nevada), 303-304
Alvarez, Cecil, 395
American Cyanamid Company, 215
American Exchange Hotel (Battle Mountain, Nevada), 206
American Institute of Metallurgical Engineers (AIME), 347, 443, 455
American Metals Climax (AMEX), 254
American Mining Association, 390
American Mining Congress, 391, 405
American River (California), 242
American Selco, 169, 185-186
Anaconda Company, 189, 348, 409, 467, 470, 523
Anaconda Mine (Yerington, Nevada), 338, 523
Ancestral American River (California), 250
Anderson, A. J., 55
Anderson, Freddie, 414-415
Andrus, Bill, 515, 519
Anhydride Oil Corporation, 423
Annett, Norman, 464, 494-496, 498
Annett, Seryl, 464, 498
Apache Junction, Arizona, 689
Argento, Tony, 8-9
Arizona, 150-151, 310, 314, 348
Arizona Mine (Unionville, Nevada), 325
Arkell Mine (Nevada), 304
Armstrong, Charles J., 352
Arrowhead Industrial Water, 252
Artemisia Hall (University of Nevada, Reno), 48
Arthur Brant Chair (Mackay School of Mines), 527-528
Asarco Company, 175, 234, 409
Association of Exploration Geochemists, 119
Atabrine, 51
Athabaska Oil Sands (Alberta, Canada), 424
Aurora, Nevada, 226
Austin, Greg, 197, 234
Austin, Nevada, 226, 344
Australia, 184-185
Austria, 443

Avondale Research Center (Maryland), 380,
385-386
Azore Islands, 206

B

B and B Mining Company, 85-86
B and B Quicksilver Mine (Montgomery Pass,
California), 431, 461, 486-487
Babbitt, Bruce Edward, 262
Baglin, Betty, 247-248, 254
Baird, Ben, 568-569, 577
Baker, Art, 511
Ball, Mrs. Walter, 716
Bank Club (Reno, Nevada), 341, 397
Barber, Ted, 257-258
Barredo, Bunny, 79
Barriek Gold Mining Company, 116, 136, 170,
186-187, 197, 249, 415-416, 418-421, 544-
545, 553
Barry, Slim, 213-214
Bartlett Creek (Nevada), 498-499
Barton, Chester, 287-288
Baruch, Bernard, 396
Basic Incorporated (Gabbs, Nevada), 77-78
Basic Magnesium (Cleveland, Ohio), 74
Basic Refractories (Gabbs, Nevada), 49, 66-67,
71, 73, 76, 81, 482, 493, 496
Basques, 206, 236, 238, 401-402
Batjer, Cameron, 376
Batjer, Marybel, 376
Battelle Institute (Columbus, Ohio), 244
Battle Mountain Gold Company, 170
Battle Mountain, Nevada, 53, 62, 100, 206,
292, 311, 497, 584, 608-609
Bauer, Don, 240
Baxter Fluorspar Deposit, 477
Beach Boys, 374
Beal Mountain Mine (Montana), 174-175
Bear Valley (Idaho), 240
Beatty, Nevada, 416, 558
Bechtel Corporation (San Francisco,
California), 156-157, 169-170, 185-186
Becko, Bill, 638, 642
Bell, Donald, 236
Bell, Enfield, 184
Bell Mine (Nevada), 184
Belmont Mine (Cottage Grove, Oregon), 662
Belmont Mine (Nevada), 643, 650, 709
Bendix Field Engineering Corporation, 355,
358, 360-361, 370, 381, 384

Benjamin, Daisy, 327
Bently, Don, 667, 672, 697
Beowawe, Nevada, 473
Bernard, Arthur, 1-35, 299
Bernard, Donald, 30-31
Bernard, Naomi (née Bremenkampf), 19, 21-
23, 33-34
Bernardini, Ricci, 1
Bernardini, Minnie (née Mussatto), 1-3, 22
Bessemer Multiple Hearth Furnace, 273
Bettencourt, John, 205
Beuhler, Jack, 5, 8-10, 15-16, 19
Bible, Alan, 377
Big Ed, 214
Big Gold Acres Mine (London Extension,
Lander County, Nevada), 100
Big Six Mine, 139, 142, 416
Bingham Pit (Salt Lake City, Utah), 403, 461
Bishop, California, 296-297, 431, 451, 462,
478-479, 481, 486, 493, 639
Bishop, Guy, 464-499
Bishop, Harry, 100, 139
Black Rock Desert (Nevada), 178-180
Blanding, Utah, 582
Bleazzard, Mr., 416
Bliss Brothers (Nevada), 206
Block, Frank, 245
Blodgett, Howard B., 351
Blomberg, Vic, 259-260
Blonden, Frank, 85-87
Blue Star Mine (Eureka County, Nevada), 100,
102-105, 110, 116, 125, 135, 141-142, 144,
413, 538
Bluebird Mine (Nevada), 87-88, 91
Bodie, California, 464, 499
Bohemian Mine (Cottage Grove, Oregon),
657, 660
Boney, Dick, 651
Bonneville Power, 225
Bootstrap Mine (Eureka County, Nevada),
100-101, 103, 116-117, 141-142, 144, 413,
538
Botswana, Africa (Bechuanaland), 96, 122-124
Botswana Geological Survey (Africa), 96
Bottle Creek (Winnemucca, Nevada), 485, 493
Boulder City, Nevada, 244, 377, 385, 391
Bowman, Betty, 496-497
Bradshaw, Mark, 572
Bradshaw Syndicate, 572, 574, 577
Bradt, Richard, 394
Brady Glacier (Alaska), 583

Brady's Hot Springs (Nevada), 315, 473
Brant, Arthur, 526-527
Brant, Ed, 258
Brenkuss, Edward, 442
Bretz Mine, 224
Bristlecone Mining Company, 680, 687
Bristol Mine (Pioche, Nevada), 9-11, 16-20, 31, 106, 300-301, 311
Bristol Silver Mining Company (Pioche, Nevada), 300-301
Broadbent, Bob, 373, 391
Broken Hills Proprietary, 409
Brown, Al, 255
Brown, Ernest, 323, 397
Brown, Web, 323, 342, 344, 397
Brundage, Avery, 646-647
Bruner, Mel, 290
Buck and Charlie Mine (Rochester, Nevada), 267-268
Buckaroo Saloon (Caliente, Nevada), 5
Buckhorn Ore, 242
Buckskin, Nevada, 517
Buenaventura, 187
Buffalo Valley Prospect (Nevada), 100-101
Bullfrog Mine (Beatty, Nevada), 197, 267
Bullion Monarch Company, 413, 417, 420
Bullion Monarch Mine (Nevada), 417
Bunker, Berkeley L., 397
Bunker Hill Mining Company, 159
Burch, Albert, 466-467, 489
Burch, Ray, 189
Burford, Bob, 372
Burke Mine (Coeur d'Alene, Idaho), 663
Burleighs, 308
Burrus family, 85-87, 91
Burrus Mine (Nevada), 85-87, 91-92
Butler, Jim, 641, 651
Butte, Montana, 83, 692-694
Byrd, Robert Carlyle, 390

C

Cadastral Survey, 686-687
Cahill, Bill, 37, 40-42, 44, 46, 48
Cahill, Charlotte "Lottie" (née McGhan), 37-38, 40-42, 52
Cahill, Thomas M., 37-84
Cahill, Thomas Nicholas, 37-43, 47-48, 52
Cahill, Tommy, 57, 59
Calaveras River (California), 250
Calgary, Alberta (Canada), 415

Calhoun, James, 29-30
Caliente, Nevada, 5, 12
California, 242, 249, 363
California Water Pollution Board, 259-260
Cambior Company, 208, 234
Campbell, S. R., 85-88, 91-92
Canada, 131, 153-155, 363, 524-527, 561, 563
Canada Tungsten, 254
Canadian Institute of Mines and Metallurgy, 412
Candelaria Silver Mine (Nevada), 197, 243, 578
Cannon family (St. George, Utah), 231
Cannon, Rita, 39-40
Cannonball Express (Los Angeles, California), 442
Carlin Exploration Program, 100-101, 106, 108, 112, 115
Carlin Gold Mine (Nevada), 95, 104-106, 110, 112-113, 116-118, 121-122, 126-127, 131, 133-136, 139, 141-146, 156, 194, 355, 389, 412-413, 416-417, 421
Carlin Mill (Nevada), 200, 389
Carlin, Nevada, 100-102, 104, 106, 109-110, 114-117, 124, 127-129, 135, 137, 160, 249, 412, 414, 523, 545, 584, 591, 600-601, 603, 607
Carlin Trend (Nevada), 103, 111, 116-119, 121-122, 133, 145, 147, 242-243, 248-249, 513, 516, 518, 521, 523, 529, 531-532, 539, 545-547, 551-552, 557-558, 584, 608-609, 613, 616, 619-620, 627
Carlton Mill (Cripple Creek District, Colorado), 163, 171-172, 177, 198
Carpenter, Jay, 218, 282-285, 335, 430, 460, 483, 504
Carroll, Bruce, 373
Carson Sink (Nevada), 356
Carson Valley (Nevada), 482-483, 492
Carter, Jimmy, 355, 360
Cavanaugh, John, 55
Cebu, Philippines, 97
Center for Strategic Materials Research and Policy Studies (University of Nevada, Reno), 392
Central Pacific Railroad, 205
Cerro de Pasco Copper Corporation (La Oroya, Peru), 220-221, 234
Chafin, Charlie, 54
Challis National Forest (Idaho), 228
Chamber of Mines (South Africa), 531, 561

- Chaplin, Claude S., 85-93
Chaplin, Jeannie (née Norquist), 88-89
Chapman, "Chappie," 268
Chapman, Professor (University of Arizona), 219, 221-222, 238-239
Cherokee Strip Race (Oklahoma), 317
Cheyenne, Wyoming, 666
Chiatovich, Bill, 648
Chiatovich, George, 401
Chiatovich, Jack, 648
Chiatovich, Marco, 648
Chiatovich, Martin, 648
Chiatovich, Pat, 647-648
Chimney Creek (Nevada), 242
China Club (Reno, Nevada), 401
Chinese Embassy, 388
Chollar Mine (Comstock), 50
Ciarlantini, Silvio, 703
Citizen Ambassadors Program (People to People International), 404-405
City Service Oil Company, 335
Civilian Conservation Corps (CCC), 216, 269
Clark, Andrea (née Raditz), 247-248, 254
Clark, Bill, 375-376, 391
Clark, Lucille Frances (née Slavin), 703
Clegg, David, 415
Cleveland-Cliffs Iron Ore Company, 508-509
Climax, Colorado, 223, 247
Clinton, William Jefferson, 186-187
Club of Rome, 403
Coeur d'Alene Company, 175
Coeur d'Alene, Idaho, 256, 383
Cohen, Joe, 14, 34
Colombo, Art, 245
Colorado, 174, 187, 252-253, 565
Colorado River Survey, 390
Colorado School of Mines, 202
Columbia Steel (Pittsburgh, California), 58, 60
Combined Metals (Pioche, Nevada), 459
Combined Production Associates, 102-103
Cominco Engineering, 254
Commercial Hotel (Elko, Nevada), 129
Comstock Lode (Nevada), 24, 49-50, 233, 295, 303, 403
Connolly, John, 702
Consolidated Chollar Mining Company, 285
Consolidated Gold Fields of South Africa, 39, 63
Contact, Nevada, 336
Continental Meridian Number One Well (Newark Valley, Nevada), 341
Coope, J. Alan, 95-147, 536-537, 554, 584-585, 589, 608-609
Copeland Lumber (Carson City, Nevada), 663
Copper Canyon Mining Company (Battle Mountain, Nevada), 60-61, 82-84, 288, 290
Copper Canyon, Nevada, 61-63, 251, 280, 288, 290-291, 293-294, 297-299, 311-313
Copper Club (New York City), 388
Copper King Bar (Golconda, Nevada), 206
Corbett, Young, 14
Cordero Mining Company, 221-223, 225, 227-229, 232, 256, 258-259
Cordero Quicksilver Mine (McDermitt, Nevada), 215, 221-228, 230, 232, 235-238, 248, 255, 257-258
Cordex/Cordilleran Exploration, 137, 515-516, 552, 558
Cornucopia Mine (Summitville, Colorado), 252-253
Cornwall, England, 443
Cortez Mill (Nevada), 163
Cortez Mine (Nevada), 116, 122, 155-168, 174, 193-196, 198-200, 202, 242, 249, 484, 558
Cosmos Club (Washington, D.C.), 390
Cotrell Precipitator, 270
Couch, Bertrand F., 461
Council on Environmental Quality, 526
Cousin Jacks, 307, 443, 586
Cox, Arthur, 569-570, 574
Cox, Cy, 473-474
Cox, Mr., 231
Craig, Doctor, 703, 705, 716
Craig, Larry, 382-383
Craigmont Mine (British Columbia, Canada), 155
Cree, Alan, 335-336
Crescent Valley, Nevada, 160, 196, 537
Cripple Creek, Colorado, 163, 201, 208
Crofoot family, 191-192
Crofoot Lewis Mine (Nevada), 178-184, 188, 191-193
Crouch, Jordan, 30
Crowell/Fluorspar Operation (Beatty, Nevada), 479
Crowley, Joseph N., 392
Crown Jewel Mine (Washington), 251
Crown Mill (Nevada), 209-210, 212-216, 263

Crucible Club (University of Nevada, Reno), 433
Culverwell, Charlie, 5
Curtis, Slim, 91
Cutty, Judge, 700
Cyprus Mining Company, 539

D

Dahlgren, "Big Jim," 278-280, 296
Dalamar Camp (Nevada), 309
Danbury, Connecticut, 596, 598
Darrow, Mr., 321
Davidson Diorite (Nevada), 303
Dawn Mining Company, 579, 615
Dayton Consolidated Mine (Silver City, Nevada), 49-50, 285
Dayton Mill (Goldhill, Nevada), 338
Dayton, Nevada, 251, 267, 287
De Smet Hall (Gonzaga University), 333
Dearborn, Michigan, 453, 510
Dee Mine (Nevada), 355, 553
Deep Mines Operation (Goldfield, Nevada), 577-578, 580
Deep Ruth Shaft (Ely, Nevada), 65
Defense Minerals Exploration Allowance (DMEA), 230, 261
Defense Production Act, 393
Degerstrom, N. A., 197
DeLaMare, Whit, 526, 553
Delaroy, Jerry, 49
Delmu, Albert, 21
Delmu, Della, 21
Delmu family, 32
Delmu, Joe, 32
DeLongchamps, Fred, 338, 351
Delta Saloon (Virginia City, Nevada), 338
Democrats, 31
Denver, Colorado, 380-381
Desert Research Institute (Reno, Nevada), 352
Diamond S Ranch (Golconda, Nevada), 205
Diamondfield Daisy Mine (Goldfield, Nevada), 320, 335
Diamondfield, Nevada, 699
Diatchkov, Sergei, 405-409
"Dirty Curly," 20-21
Dixie Apex Mine (St. George, Utah), 231-232
Dixie Valley Earthquake (Nevada), 352
Dodge Construction Company, 209, 211, 213-214, 248

Dole, Elizabeth, 397
Dole, Hollis, 389-390
Donovan, Bill, 29, 288, 314, 472
Dorr Company, 219
Douglas, Hugh Scott, 415, 418-419
Drysdale, Mr., 50, 53
Duffy, Martin, 577
Duluth Gabbro (Minnesota), 244
Duncan, Donald, 149-203
Durango, Mexico, 72-73
Duval Corporation, 170, 176, 234

E

E. L. Cord Mill (Silver Peak, Nevada), 52, 54, 433, 435-437, 440, 444, 446-447, 449, 479
E. Otis Vaughn Middle School (Reno, Nevada), 426
East Utah Mining Company, 415, 418
Eastgate, Nevada, 468
Edgar brothers (Battle Mountain, Nevada), 102-103
Eisenhower, Mamie, 391
Eisle, Judy, 248
Eklund, Lou, 590
El Salvador, 51
Elko County (Nevada), 346, 595
Elko, Nevada, 115, 128-129, 565, 591, 603, 621-622
Elliott, Russ, 401
Elston, Bob, 271
Ely, Nevada, 24-25, 64-65, 68-70, 248, 299, 307, 335, 428, 457, 461, 468, 495, 591
Emeryville, California, 58
Emmett, Idaho, 653
Energy Research and Development Administration (ERDA), 355-356, 360
Engle, Abe, 261
Environmental Protection Agency, 536, 558
Enzer, Herman, 373
Ephraim, Utah, 2-3
Erb, Fred, 474
Etchart, John, 222, 296-297
Eureka County (Nevada), 100, 595
Eureka, Nevada, 60-61, 419, 536
Exxon Corporation, 234

F

Fad Shaft (Eureka, Nevada), 60-61
Fairbanks, Alaska, 250-251

Fallon, Nevada, 80, 341, 473, 476
Farrington, Ben, 329
Feather River (California), 250
Federal Land Policy and Management Act (1976), 533, 557, 559
Felix's Bar (Lovelock, Nevada), 237
Felmont Oil, 198
Fields, Russell, 477
Finnish, 443
First Fleet (U.S. Navy), 343
First Miss Gold, 394-395, 410
First Mississippi Corporation (Jackson, Mississippi), 395-396
First National Bank (Reno, Nevada), 30-31
Fisher, Bill, 389-390
Fisher, Fred, 236-237, 255
Fisher, Marion, 100, 102
Five Mile (Nevada), 466
Five-to-One Shaft (Laguna Mine), 567
Fleischmann, Max C., 29
Fleming, Ray, 715
Flin Flon Mine (Canada), 261
Florence, Arizona, 342
Florence Mine (Nevada), 577, 648
Florida Canyon (Nevada), 175, 187
Flowery District (Virginia City, Nevada), 211
Foley Brothers (New York), 65
Food Machinery Corporation (FMC), 184, 234
Ford, Chuck, 257-258
Ford, Ford B., 368, 373-374
Ford, Henry, 452, 482, 507-509
Ford Motor Company, 452, 481-483, 507-510
Ford, Washington, 578
Forsey, Dave, 384
Fort Douglas, Utah, 574
Fortieth Division (U.S. Army), 575
Forward family (Manton, California), 376
Foster, Jimmy, 716
Foster, Verne F., 189-190
Franco Nevada Mining, 415
Frandsen, Carl, 212-213, 219
Fransway, John, 329
Frazer Creek Mining Company (Nevada), 517
Frazier, Jim, 108
Freeport Minerals, 184
"Frenchy," 459
Fresnillo, Mexico, 63-64
Friends Club (Washington, D.C.), 391
Fulton, Bob, 100, 105-109, 112-118, 121, 127, 137-138, 538-540, 555-556, 578, 580, 583-587, 592, 610, 612, 621

G

G. I. Bill, 334-336
Gabbs, Nevada, 26, 42, 65-68, 70-74, 76-82, 243, 296, 329-330, 452, 468, 476, 493
Gallagher, Mervin J., 237
Galli, Pete, 137, 170, 234, 537, 554, 558
Galvin, Sanford, 715
Gardnerville, Nevada, 266
Gates, Bob, 68
Gates, Ellis, 221
Gem Claims (Nevada), 234
Gemmell, Paul, 18-19, 190, 301, 429, 459
Genesis Mine (Nevada), 116
Getchell Gold Corporation, 395-396, 410
Getchell Mine (Golconda, Nevada), 26-28, 84, 159, 209, 211-212, 217, 219-222, 238-239, 243, 248-249, 257, 263, 269, 272, 278, 280, 290, 292, 294-297, 299, 306-307, 311, 313-315, 350, 369, 394-396, 474, 513, 521-522, 524, 530, 537, 545, 551, 558, 598, 609
Getchell, Noble, 26-28, 211, 297, 396
Getchell Turquoise Ridge Mine (Golconda, Nevada), 398-399
Gianella, Vincent P., 282-283, 285, 335, 340, 470
Gibellini, Louie, 78
Gilbert, Eldon, 222
Girdley, Arch, 356
Glamis Mine (Imperial County, California), 250
Glasgow Western Company, 211
Glass Buttes (Lake County, Oregon), 230, 245
Glenn, John, 377
Glenwood Hot Springs, Colorado, 318
Globe, Arizona, 299
Goin, Peter, 543
Golconda Hot Springs Hotel (Golconda, Nevada), 206
Golconda Land and Cattle Company, 206, 208
Golconda, Nevada, 205-209, 249, 254, 257, 270
Gold Acres Mine (Lander County, Nevada), 100, 102, 114-115, 122, 132-133, 139, 141, 159, 162-163, 200, 216, 227, 551
Gold Quarry Pit (Nevada), 102, 136, 141, 187, 584, 619, 627
Gold Run Mining District (Nevada), 208-211
Goldbug Mine (Nevada), 266
Golden, British Columbia (Canada), 412
Golden Dumps Mine (South Africa), 170-171, 177, 198

Golden Gate Bridge (San Francisco, California), 575
Goldfield Consolidated Company, 220, 239, 396, 572, 575
Goldfield, Nevada, 52, 257, 320, 335, 396, 442, 448, 503, 545, 567, 569, 572, 577-578, 580, 587, 618, 627, 645
Goldstrike Mine (California), 197, 415
Goldstrike Mine (Nevada), 116, 136, 186, 412-414, 416-417, 419-420, 422
Gomes, Agnes, 208-209, 212, 214
Gomes, Antoine, 205
Gomes, George, 206-212, 214, 217-218, 233, 239
Gomes, John Milton, 205-263
Gomes, John A., 205-209, 257
Gomes, Lottie (née Bailor), 206-208, 220
Gomes, Manuel, 205
Gomm, Florence, 40
Gomm, Roy, 40
Gonzaga University (Spokane, Washington), 333, 343
Good Hope Claims, 141
Gooding, Idaho, 653
Gorbachev, Mikhail Sergeyevich, 405
Gordon, Louis D., 39, 506
Gould, Mike, 49
"Gow House" (University of Nevada, Reno), 220
Gowen Field (Boise, Idaho), 216
Graeagle, California, 233
Graham, Tom, 240, 245
Graham, William J., 341, 397
Grand Junction, Colorado, 356, 365
Granges Exploration, 178, 190-192
Granite Creek Mine (Nevada), 280-281, 296
Grants, New Mexico, 169
Grass Valley, California, 443, 616, 618
Grassi, Tom, 19
Great Lakes Naval Training Station (North Chicago, Illinois), 334
Greater Vancouver Environmental District (British Columbia, Canada), 254
Green, Tony, 29
Greenen, Jim, 27
Greenslit, Chuck, 356-357
Griffith, Mr., 43
Groom, Nevada, 578
Gros Brukkaros (Namibia), 421-422
Guadalajara, Mexico, 633-644
Guatemala, 71-72
Guild, Clark J., 29-30, 288

H

H. W. Gould and Company (San Francisco, California), 56, 59
Haas, Vern, 223-224, 228, 255, 257-258
Hagar, Jim, 220
Hager, Dorsey, 413
Hager, Ed, 223, 228-229
Hager, Seeley and Sweet, 413-414
Haileybury School of Mines (Ontario, Canada), 149-150
Hammond, Claude, 218
Hanford, Washington, 365
Hanna Mining Company, 453, 496, 510
Hardie, Byron, 106-107, 113-117, 301, 587, 592-593
Hardy, Ray, 647
Hardy, Roy, 27-28, 211, 222, 228, 239, 296, 396
Hardy, Royce, 84, 222, 239, 295, 297
Harolds Club (Reno, Nevada), 296, 341
Harrigan, Nellie J. (née Anderson), 265
Harrigan, William Anderson, 84, 265-315
Harrigan, William T., 265-268, 270-271
Harrington, John, 375
Harris, Len, 145
Hartford Assemblage (Nevada), 304
Hartford Hill (Nevada), 288
Hartford Mining Company (Comstock), 50
Hartley, Gerry, 431, 434-435, 441, 444, 461-462, 467-468, 471, 482, 486-487, 489, 492-494
Harvey, "Hardway," 213
Harwood, Dewey "Bud," 220
Harwood, Paul, 456
Haseman, Charles, 456, 460
Hatch, Bob, 517
Hausmann, John "Moonshine Johnny," 442, 447
Hausmann, Mary, 442, 501-502
Hawaii, 574-575
Hawkes, Herb, 118
Hawkins, Mr., 52
Hawthorne, Nevada, 80, 329
Hays Adams Hotel (Washington, D.C.), 391
Hayworth, Martin, 654, 656-657, 660, 662
Hecla Mining, 232, 243
Heinen, Harold, 242, 248
Heizer, John, 315, 523
Henderson, Nevada, 73, 329, 369
Hendrickson, Ray, 230, 259-260
Hendrix, James L. 530

Henley, Bill, 286
Henry, Tom "Doc," 245
Herd, Hugh, 702
Hernandez, Joe, 704
Herrera, Carl, 312
Herreshoff Furnace, 75, 79, 222, 226, 248, 255-256
High Country News, 533, 565
Highway 40 (Nevada), 128
Hispanics, 402
Hodel, Don, 372, 375, 379
Hog Ranch Mine (Nevada), 197
Hogg, John, 415
Hollingsworth, Ed, 235
Holmes, George, 646
Homestake Mine (Deadwood, South Dakota), 685
Homestake Mining Company, 61, 99, 114-115, 168-171, 177, 191, 198, 201, 504, 511-512, 517-518, 548
Honerein Mine (Stockton, Utah), 4-5, 16
Hoover Dam (Boulder City, Nevada), 377
Hoover, Herbert, 542
Hornabrook, Barry, 388-389
Horning, Jean, 496-497
Horton, Betty, 324, 329-333, 397
Horton, Beverly Jean (née Burhans), 343, 354, 356, 358-359, 389
Horton, Cindy Kathleen, 360
Horton, Debra Lynn, 343, 359-360
Horton, Eathel Margareddia (née Miller), 319-320, 324, 327, 329
Horton, Frank Elijah Sr., 317-321, 325, 327-332, 335, 338
Horton, Frank Jr., 321, 322, 324
Horton, Fred, 317-318
Horton, George, 317, 369
Horton, Orville, 321, 324
Horton, Phyllis (née Steinheimer), 324
Horton, Richard, 324, 333-334, 390-400
Horton, Robert Carlton, 245, 317-410, 515
Horton, Robin Elizabeth, 343, 359-360
Hoskings, Bill, 296
Hotazel (Kalahari Desert, South Africa), 389
Houdascheldt, Darrell, 416
Howard, Connie, 564
Hoyer Steny H., 379-380, 387
Hudgens, Charlie, 702
Hudlow, Mr., 87
Hugo, Piet, 388-389
Humboldt River (Nevada), 253
Humphrey Spiral, 223

Hungry Horse, Montana, 693-694
Hunt, Charles Warren Jr., 411
Hunt, Charles Warren III, 411-424
Hunt, Frank, 497
Hunter Lake (Nevada), 269
Hycroft Resources and Development, 177-178, 183-184, 187-188, 190-192, 194
Hymer, Lew, 331

I

Idarado (Colorado), 582, 606, 620, 623
Imlay, Nevada, 338, 476
Imperial College (London University), 95-96, 119
Imperial Valley (California), 669
Independence Mine (Nevada), 184, 389
Independence Mountain Range (Nevada), 184
Industrial Workers of the World (IWW), 502-503
Inspiration Copper Mining Company (Globe, Arizona), 299
International Carbide of Canada, 254
International Smelting and Refining (Salt Lake City, Utah), 62
Irish, 236
Iron Ore Company of Canada, 153-155
Isbell Construction Company, 584, 590, 597, 599, 615
Isle of Man (British Isles), 118-119
Italians, 1-2, 6, 8
Izabal Lake (Guatemala), 71-72

J

Jaca, Jess, 222, 224, 238, 256
Jackrabbit, Nevada, 10
Jackson, California, 50
Jacobber, Gordon, 335-336
Jacobson, Halvor, 265
Jacobson, Stoddard, 668, 687-688
James, Jessie, 415
Janovich, Milo, 286-287, 308
Janovich, Mrs., 287
Japan, 247, 365
Jarrett Canyon (Nevada), 242, 249
Jefferson Creek (Nevada), 45
Jenny Lind Mine (Forest Hill, California), 250
Jensen, Kendall, 416
Jerome, Arizona, 67
Jerome, Jerry, 351-352, 355
Jett Creek (Nevada), 45

Jim Butler Motel (Tonopah, Nevada), 701
Johnes, D. C., 702
Johnson, Andy "Big Mormon," 278
Johnson, Clayton, 237-238
Johnson, H. A., 703
Johnson, Stan, 229
Johnston, Bill, 389
Jones, Charlie, 273
Jones, Ken, 348, 517
Joralamon, Ira, 325
Joralemon, Pete, 273-274
Joy, Doctor, 638, 642-643
Joyce, Bernita, 380-381
Judge Mine (Park City, Utah), 658, 666
Julie Shaft (Copper Canyon Mine), 82-84,
291, 297-298
Jungo, Nevada, 452, 503

K

Karasevich, Pete, 87
Kaufman, Elmer, 419-420
Kaweah River (California), 242
Keele, Ed, 12-13
Keele, Jake, 13-14, 34
Keele, Jigs, 12-13
Kellinski Shaft (Ely, Nevada), 65
Kelly Creek (Nevada), 299
Kennametals, 230
Kennecott Copper Corporation (Ray,
Arizona), 64, 68, 151-153, 189, 335, 338,
351, 403, 409, 427, 495
Kennedy Mine (Jackson, California), 50-51
Kerr McGee, 114
Keystone Mine (Nevada), 285-286
Khrushchev, Nikita, 114
King Hill, Idaho, 653
Kings Canyon (Carson City, Nevada), 663
King's College (London University), 95
Kinnear, John, 335
Kirby Canyon (Nevada), 270
Kirchen, Bill, 54
Kirchen family (Nevada), 54
Kittle, Otis, 479-480, 482-483, 493-494
Knaebel, Jack, 51, 53
Knob Deposit (Nevada), 234
Knoblock, Keith, 390-391
Knoll Creek (Nevada), 336
Korean War, 153, 221, 227, 239
Kornze, Larry, 140
Kossuth Mine (Nevada), 285
Kral, John, 501-502

Kral, Juana (née Barber), 468, 476, 496
Kral, Victor, 52, 54, 58, 344, 425-519
Kuskokwim River (Alaska), 56

L

L. C. Griffin Jeweler (Reno, Nevada), 468
La Canan (Sonora County, Mexico), 699
Labor Day Celebration (Pioche, Nevada), 7-9
Lacana Mining, 170, 197
Laguna Mine (Nevada), 567, 569
Lake Havasu City, Arizona, 86
Lake Lahontan (Nevada), 341
Lamm, Richard D., 628
Lander County (Nevada), 196
Lander, Walt, 380-381
Landusky, Montana, 173-174
Langley, Jack, 344
Lansky, Meyer, 341
LaPoint, Deedee, 565
Laramie, Wyoming, 666
Larin, Vladimir, 422
Larsh, Mr., 68
Larson, Chris, 2
Larson, Dick, 336
Las Vegas, Nevada, 362
Lawrence, Ed, 345
Lawrence Livermore National Laboratory
(Livermore, California), 361
Laxalt, John, 390
Laxalt, Mickey, 390
Laxalt, Paul Dominique, 358, 373-374, 377,
390, 392, 394
Laxalt, Robert, 236, 390
Lazarini, Louie, 19
Lee, Harry, 213-214, 216
Lehman Caves (Nevada), 429, 459
Lehr, Lou, 276
Leonard Creek (Nevada), 464-465, 498-499
Leviathan Sulphur Mine (Nevada), 433-434,
467, 469-470, 492-493
Levine, Sam, 644
Lewis, Elaine, 679, 687
Lewis Mine (Nevada), 191-192, 194
Leyte Island, Philippines, 575
Lida, Nevada, 27, 567
Limon, Loretta, 37, 44, 65, 73
Lincoln, Francis Church, 351
Lincoln Hall (University of Nevada, Reno), 47,
220
Lincoln High School (Los Angeles, California),
40-42, 47

Lindauer, Sid, 415
 Lingayen Gulf, 575
 Liston, Sonny, 129
 Little Gold Acres Mine (Nevada), 115, 132, 136
 Litton Industries (Los Angeles, California), 112, 413
 Livermore, John S., 98-107, 109, 121, 124-126, 129-131, 137-139, 141-143, 147, 170, 521-566, 589, 610
 Livingstone, Wayne, 191
 Loncar, Bob, 567
 Loncar, Carolyn, 627
 Loncar, Danny, 627
 Loncar, David, 627
 Loncar, John, 567
 Loncar, Naomi (née Geib), 576, 582-583, 588
 Loncar, Nicholas P., 567-568
 Loncar, Peter N., 99-100, 106-109, 113-116, 128, 130-131, 137, 539, 555, 567-631
 Loncar, Peter N. Jr., 622
 Loncar, Steve, 567, 577-578
 London Extension (Lander County, Nevada), 100, 115
 London University (England), 95-96, 536, 554
 Lone Star Mine (Bishop, California), 462, 487, 494-495
 Long, Jane, 544, 564
 Longstreet Mine (Nevada), 434, 466, 489
 Los Alamos National Laboratory (Los Alamos, New Mexico), 361
 Lost Dutchman Mine (Arizona), 688
 Lost Weekend Bar (Butte, Montana), 693
 Lovelock, Nevada, 237, 268, 296, 451-452, 476, 503
 Luna, Jim, 637
 Luna, Julio, 651
 Lynn Creek (Nevada), 139-140
 Lynn District (Nevada), 416
 Lynn, Susan, 535, 561
 Lynn Window (Nevada), 538

M

MM&S Mining Group, 102-103, 109, 114
 Mackay, John, 393
 Mackay School of Mines (University of Nevada, Reno), 52, 54, 78, 81, 107, 217-218, 221, 228, 281-283, 307, 335-336, 338, 340, 344, 349, 351, 387, 392-394, 400, 426, 456, 470, 472, 475, 478-479, 494, 496-497, 503-504, 526-527, 529-530, 532, 542, 561

Madsen, Bob, 340, 342
 Magadan, Russia, 405-407
 Maggie Creek (Nevada), 102-104, 110, 135-137, 141, 167, 187
 Maher, Kent, 236-237
 Makowski, Joe, 215
 Malakoff Diggings (Nevada City, California), 541
 Malley, Ed, 699
 Malone, Mrs., 706
 Malozemoff, Plato, 121, 137-138, 547, 596, 602
 Manhattan, Nevada, 54, 267, 702
 Manila Bay, 343-344
 Maranjan, El Salvador, 51
 March Field (California), 216
 March of Dimes Day (McDermitt, Nevada), 263
 Marchant, Wayne, 391
 Marcuerquiaga, Eddie, 237-238
 Marigold Mine (Unionville, Nevada), 323, 325, 331, 515
 Marigold Mine Number Two (Valmy, Nevada), 327, 330, 332, 515-516, 608
 Marigold Prospect (Nevada), 100-101
 Marsh Creek (California), 259-260
 Martin, Conrad, 74, 79, 476
 Martin, Vern, 80
 Martinez, Catalina (née Castille), 634, 636, 641-642
 Martinez, Felix, 633-635
 Martinez, Jacinta, 634-635
 Martinez, Jesse, 641-642
 Martinez, Jesus, 633-651
 Martinez, John, 642
 Martinez, Manuel, 642
 Mary Mine (Silver Peak, Nevada), 445, 449
 Marysville, California, 250, 259
 Marysville Cantonment Area (California), 476
 McBeth, Jay, 167, 601
 McCall, Doctor, 12, 14
 McCarran, Patrick A., 323, 396-397, 706
 McClure, Jim, 378-379, 382
 McCracken, Robert, 701
 McCullough Development Company, 86
 McDermitt, Nevada, 224, 236-238, 255, 258, 263
 McDonald, Webster, 419-420
 McDonnell, Frank, 701
 McGill, Nevada, 401, 457
 McGill, Sandy, 247-248
 McGillivray, Christy, 40

- McGuire, Mac, 230
McIntyre Porcupine Mines (Toronto, Canada), 107
McKay, James, 173, 397
McKinley Park School (Reno, Nevada), 327
McLaughlin Mine (Lake County, California), 249
McQuiston, Frank, 116, 530, 547, 602
McTaggart, Mr., 269
Meese, Ed, 373
Meikle Mine, 142
Meiser, Vern, 355
Merced River (California), 250
Mercur Mine (Utah), 140-142, 146
Mercury, Nevada, 637, 639, 642
Meselod, Amelia, 6
Mesquite Mine (Imperial County, California), 250
Metcalf, Dick, 224, 230, 236, 258
Mexico, 633-634
Michigan, 151
Midas, Nevada, 207-208
Midland Garage (Gardnerville, Nevada), 266
Mieneke, Paul, 83
Milich, Andy, 294
Milich, Bill, 294
Miller, Dan, 358-359, 372-373, 375, 389-391
Miller, Glenn, 404, 536
Miller, Pefick and Hudlow Mining Company (MP&H), 87, 92
Mills City, Nevada, 268
Mina Mercury Mine (Nevada), 55-56, 59
Mina, Nevada, 577
Mindanao, Philippines, 53, 575
Minden, Nevada, 493
Mine and Smelter Union, 256
Mine Safety and Health Administration, U.S. Department of Labor (MSHA), 188, 368, 373
Mineral Ridge Resources, 188
Minerals and Materials Information Center, U.S. Bureau of Mines, 393
Minerals Yearbook, 368
Mining Act (1887), 105, 189
Mining Law (1872), 534, 559-560, 562
Minnesota, 151
Mizpah Hotel (Tonopah, Nevada), 700-701
Mizpah Mine (Tonopah, Nevada), 639-640, 651, 709
Moffett Field (Mountain View, California), 342
Mohawk Mine (Silver Peak, Nevada), 643-644
Molinelli Hotel (Virginia City, Nevada), 49
Mollath, Conrad, 422
Moly Corp, 240
Monarch Mine (Nevada), 666-667, 671, 673-674, 677
Mono Basin Transport Company (Gardnerville, Nevada), 265
Montana, 174, 187
Montana Mine (Tonopah, Nevada), 639-640
Montgomery Shoshone Mine (Beatty, Nevada), 196-197
Montoro Mining Company, 174
Montrose, Colorado, 115, 578
Morales, Raymond, 651
Mordy, Wendell A., 352
Morgan, John, 372-373, 381
Mormons, 2-3, 231
Morning Mine (Coeur d'Alene, Idaho), 663
Morococha Mine (Peru), 221
Moroney, Dorothea "Chrome Queen," 548
Morrill Hall (University of Nevada, Reno), 48
Morris and Knutsen, 63-64
Morris, Bob, 109-110, 413, 420-421
Morris, Joel, 220
Mother Lode (California), 242, 443
Mott, Bill, 379
Mount Davidson (Nevada), 303
Mount Diablo Quicksilver Mine (California), 259-260
Mount Leyshon Mine (Queensland, Australia), 184-185
Mountain City Copper (Elko County, Nevada), 217
Mountain Pass Deposit, 240
Mountain States Legal Foundation, 376
Mulligan, Donny, 715
Mullin, Mrs., 703
Murphy, John, 385
Murphy, Matt, 19, 26-27
- N**
- National Endowment for the Arts, 382
National Energy Program (Canada), 412
National Society of Professional Engineers (Reno Chapter), 400
National Uranium Research Evaluation Program (NURE), 355-356, 359-360, 370, 389
Nautilus, 370
Naveran, Alfonse, 236
Neal, Dave, 70
Nelson, George "Baby Face," 397
Nevada, 242, 401

Nevada Bureau of Mines and Geology, 145,
 340, 344-345, 348-349, 351-352, 355, 358,
 361, 391, 410, 451, 483-484, 503-504, 506-
 507, 529, 532
 Nevada Consolidated Copper Company, 427
 Nevada Department of Health, 474
 Nevada Dominion Mine, 85, 87-89, 91
 Nevada Highway Patrol, 196
 Nevada Industrial Commission, 716
 Nevada Massachusetts (Mill City, Nevada),
 249, 263, 330, 339, 476
 Nevada Mile Ranch, 315
 Nevada Mining Analytical Laboratory, 340,
 345
 Nevada Mining Association, 28-29, 188-190,
 344, 429, 486, 506, 628
 Nevada Scheelite Mine (Mineral County,
 Nevada), 230, 232-233, 235, 255, 259, 263
 Nevada Society (Washington D.C.), 377
 Nevada State Highway Department, 432, 467
 Nevada State Museum (Carson City, Nevada),
 29-30
 Nevada Test Site (Nye County), 361
 New York Shaft (Dayton Consolidated Mine),
 285-286, 338, 340
New Yorker, 139, 147
 Newman, Bill, 222, 239, 295
 Newmont Mining Company, 96-103, 105-110,
 113-122, 133-139, 144-146, 156, 167, 187,
 193-194, 197, 200, 242, 249, 297, 301, 389,
 396, 410, 413-414, 420-421, 524, 527-528,
 530-532, 536-537, 546-547, 550, 556, 558,
 567, 569, 577-580, 583, 589, 595-596, 606,
 618, 620, 627
 Newpark Mine, 305, 311-312, 315
 Nicholson, David, 416
 Nielson, Ray "Swede," 4-5
 Nivloc Mine (Nevada), 52, 54, 570
 Nivloc, Nevada, 570
 Nixon, George, 206
 Nixon, Richard Milhous, 389
 Noble, Larry, 421
 Nojima, Roy, 221-222, 239
 Noranda Company, 110, 234
 Norris Drugstore (Pioche, Nevada), 14
 Norris, Edna, 14
 North, Morgan, 50, 55
 Northumberland, Nevada, 52, 67, 69-70, 522
 Northwest Mining Association, 379
 Norwegians, 236
 Nye County (Nevada), 451, 483, 504-506

O

O'Callaghan, Donal N. "Mike," 78
 Occidental Minerals, 197
 Occidental Petroleum, 169
 Occupational Safety and Health
 Administration (OSHA), 45-46, 214-215,
 227
 O'Donnell, Jim, 388
 Oklahoma, 571-572
 Old Mexican Pete, 280
 O'Neill, Thomas Phillip Jr. "Tip," 392, 394
 Onjan, El Salvador, 51
 Ophir Canyon (Utah), 578
 Ophir, Utah, 3-4
 Oregon, 242
 Ornales, Bonny, 704
 Oroville, California, 250
 Orphan Girl Mine (Butte, Montana), 663, 665
 Osborne, Maynard, 681
 Osceola Placer Mining District (Nevada), 197,
 251
 Ouray, Colorado, 606
 Overman Mine (Comstock), 50
 Overton, Al, 390-391
 Overton, Ted, 504

P

Pacific Mineral Industry Conference, 347-348
 Paiute Indians, 38
 Palabora (South Africa), 389
 Palatka Village (Siberia, Russia), 406-407
 Paley Report, 403
 Palmer, Walter "Squeaky," 218, 282, 285, 340,
 470-471
 Pan-Australian Mining, 184-185
 Pancana and Polar Resources, 197, 416, 418-
 419
 Paradise Valley, Nevada, 205, 207
 Park City, Utah, 293, 298-299, 306, 310, 314
 Parowan, Utah, 23
 Patterson, Floyd, 129
 Payne, Tom, 236
 Pearce, Les, 258
 Pearl, Josie, 464-465, 498-499
 Peavine Mountain (Reno, Nevada), 302-304,
 308, 338, 465
 Peck, Dallas, 372, 375, 378-379
 Pefick, Mr., 87
 Pegasus Gold Company, 173-175

Pendley, Perry, 358, 371-376, 383
Penn Salt, 227
Pennington, Bill, 354-355
Perkins, Elmer, 617
Perkins, Jim, 67, 69
Persia Lode (Nevada), 302
Peru, 56-58, 187, 220-221
Peterson, Holger "Pete," 224, 230-231
Phalen, Frank, 127
Phelps Dodge Corporation, 234
Philippines, 96-97
Phillips Milk of Magnesia Company, 71
Phipps, "Heavy," 213-214
Pierce, Al, 286
Pierina Mine, 187-188
Pine Creek Tungsten Mine (California), 229, 494
Pine Nut Mountains (Nevada), 668
Pinson, Clovis, 270
Pinson Mill (Nevada), 171, 198, 201
Pinson Mine (Nevada), 170-173, 184, 200, 202, 531, 533, 536, 543, 552, 558-559
Pioche, Nevada, 5-13, 20, 243, 300-301, 468
"Pitch" Uranium Project (Gunnison, Colorado), 168-169
Pittman, Key, 396-397
Pittsburgh, California, 58
Pittsburgh Station (U.S. Bureau of Mines), 241, 385
Placer Dome Company, 155-157, 159, 168, 224, 226, 256, 396, 410
Platner Mine (Crooked Creek, Nevada), 230
Poeville, Nevada, 302
Poker Flat, California, 464
Pony Springs (Nevada), 7
"Popalation John," 308
Popovich Hill (Eureka County, Nevada), 109-113, 538, 584, 611-612
Popovich, Mr., 109, 413-414, 416, 420, 584
Popovich, Mrs., 109, 584
Porcupine Belt (Ontario, Canada), 117
Portuguese, 206-207
Potter, George, 164, 198, 412, 418
Potti, Joe, 275-277
Powell, John Wesley, 390
Prescott Lease (Silver Peak, Nevada), 437
Price, "Antimony Queen," 548
Pringle, Bill, 230
Prochnau, John, 169-170, 185-186
Procter R. Hug High School (Reno, Nevada), 401

Public Resource Associates, 535
Public Service of New Mexico, 197
Public Works Administration, 467, 469, 482, 492
Pyramid Lake (Nevada), 92

Q

Quien Sabe (Hollister, California), 222
Quinn River Mercantile (McDermitt, Nevada), 224, 257

R

Rabbithole, Nevada, 31-33
Ragged Top Mountains (Nevada), 92
Railroad Hotel (Carlin, Nevada), 128
Railroad Valley (Nevada), 342, 354, 423
Rainbird sprinklers, 158, 165, 175-176
Ralph J. Roberts Center for Research in Economic Geology (Mackay School of Mines), 532, 561
Rare and Precious Metals Station (Reno, Nevada), 240
Raring, Robert H., 290, 292-293, 297
Rasmussen, Marvin, 616
Raven Electronics, 354-355
Rawhide, Nevada, 267
Raymond, Elizabeth, 543
Rayrock Resources, 170
Reagan, Nancy, 374
Reagan, Ronald, 372-378, 382, 391
Red Metals Mine (Nevada), 302-303
Redbird Mine (Lovelock, Nevada), 296
Redding, California, 423
Redelius, Julius, 302-304, 313
Reed, George, 258
Reed, Kenny, 224-225, 257-258
Reeves, Bob, 514, 517, 519
Reeves, Claudia, 237
Reilly Mine (Nevada), 278
Reinhardt's Store (Golconda, Nevada), 209
Relief Canyon Mine (Lovelock, Nevada), 197, 252-253
Renner, Becky, 375-400
Reno Evening Gazette, 409-410
Reno High School (Reno, Nevada), 239, 426, 456
Reno, Nevada, 48, 248, 324, 361
Rhia, Frank, 323
Rhodes, Cecil, 317

Rhodes, Mrs., 284
Rhyolite, Nevada, 267
Richmond Mining Company (Eureka, Nevada), 61
Ricker, Spangler, 261
Rickover, Hyman G., 370
Riley Mine (Nevada), 217-218, 222, 239, 296-297
Rio Tinto Mine (Mountain City, Nevada), 24, 217, 468, 472-473, 477
Roberts Mountains Thrust (Nevada), 103-104, 125, 414, 536, 538, 551-552, 555, 558
Roberts, Ralph, 98, 103, 125, 514-515, 519, 531, 536, 551, 555, 584
Rochester, Nevada, 236, 267-268
Rochester Silver Mine (Nevada), 175
Rock Creek Ranch (Nevada), 208
Rocketdyne Company, 86, 88, 91-92
Rocky Flats, Colorado, 365
Rodeo Creek Valley (Nevada), 414, 422
Ronzoni, "Mom," 702
Rooney, Matt, 230
Roosevelt, Franklin Delano, 330, 396
Rosenbaum, Joe, 164, 198
Rosencrance, John, 229, 232
Ross, Charlie, 213
Roumage, Fred, 503
Round Mountain Gold Dredging Company, 39
Round Mountain Mining Company, 39
Round Mountain, Nevada, 37-39, 42-45, 50-52, 62-64, 66, 70, 82, 84, 197-198, 243, 248, 267, 401, 505-506, 512, 664, 695
Round Mountain Nugget, 78
Royal School of Mines (Imperial College, London University), 95, 118
Ruby Hill Mine (Eureka, Nevada), 99
Ruby Hill Mine (Gardnerville, Nevada), 266
Ruckle, Doc, 238
Runyan, Damon, 277
Russell, Eddie, 643-644
Russia, 405-409
Russian Geological Survey, 408
Russians, 352, 406-407
Ruth, Nevada, 336, 339, 348, 403, 426, 456, 461
Rye Patch Reservoir (Nevada), 237

S

Saga Corporation, 234
Sagebrush Saloon (Pioche, Nevada), 6-9, 12-13

Saint Joe Minerals, 196
Saint Mary's Hospital (Reno, Nevada), 702
Salisbury, Harris, 164, 198
Salt Lake City, Utah, 299-300, 412, 416, 637, 665
Salt Lake Station (U.S. Bureau of Mines), 247, 631
Salt Lake Tribune, 114, 129
San Gabriel Valley (California), 242
San Juan, Puerto Rico, 113
Sandorf, Irving, 470
Sandy Bottom Golf Course (Gabbs, Nevada), 79
Santa Elena, 51
Santa Fe Pacific Minerals, 197
Savage and Sons (Reno, Nevada), 266
Sawyer, Grant, 401
Schefferville, Canada, 154-155
Scheid, Vernon E., 344-345, 347-349, 351
Scheiner, Bernie, 243
Schilling, John, 358
Schwartz, Martha, 543, 548
Schwinn, Jack, 703
Scotland, 118-119
Scott Motel (Carlin, Nevada), 128
Scrugham Engineering and Mines Building (University of Nevada, Reno), 351, 484
Scrugham, James G., 31-34, 396-397
Seaborn, Earl, 270
Searchlight, Nevada, 487
Searcy, Professor, 456
Searls, Fred Jr., 103, 107-108, 121, 127, 137-138, 297, 413, 420-421, 524-525, 539-540, 555-556, 578, 580-581, 587, 618
Sears, George W., 456
Seattle, Washington, 251
Seeley Mudd Building (California Institute of Technology), 413
Selection Trust (London, England), 169, 185-186
Seligman Canyon (Nevada), 578
Semenza, Miss, 327
Senior Executive Service, 381
Seven Islands, Canada, 154
Seven Troughs (Nevada), 487-488
Seventh Air Force, 216
Shallenberger, George, 206-207
Shallenberger, Rachel, 206
Shaw, Van, 240
Sheep Creek (Nevada), 413, 420
Sheldon, Bob, 115-116, 119, 595
Shell Oil Company, 342, 354

- Shipley, Bill D., 653-698
Shipley, Blanche M. (née Reeve), 653-698
Shipley, William J., 653
Shirley, Ernie, 645
Shirley, Louie, 645
Shoal Project (Fallon, Nevada), 352-353
Shoshone Canyon (Nevada), 44
Shoshone Creek (Nevada), 45
Siberia, Russia, 406
Sibley, Frederick H., 470
Sieberg Lake (Nevada), 618
Sieffert, Doctor, 474
Sierra Chemical, 89
Sierra Club, 251, 404
Sierra Pacific Power Company, 271
Sigma Gamma Epsilon, 49, 67-68
Silver City, Nevada, 285-286, 288, 472
Silver Peak, Nevada, 52-54, 146-147, 188, 401, 439-441, 448, 472, 516, 570, 645, 648
Silverado Mill (Nevada), 434, 493
Silverado Mine (Wellington, Nevada), 469
Silvy Smelter (Salt Lake City, Utah), 640
"Ski Jumper," 307-308
Skinner, Lou, 341
Sky Room, Mapes Hotel (Reno, Nevada), 334
Slade, "Iron Jaw," 8-9, 11-12
Slavin, Charles Leo, 699-700
Slavin, Edward Robert, 699-716
Slavin, Frances Rose (née Geraghty), 699-700
Slavin, Helen K. (née Reed), 703
Smith, Raymond I. "Pappy," 341
Smith's Clothing Store (Oakland, California), 217
Smokery Bar (Virginia City, Nevada), 338-339
Smoky Valley Mining Company, 177, 187
Smythe, Bill, 218, 282, 285, 340
Snell, Elmer, 84, 290, 293, 298
Snider, Joan, 248
Snow Family (St. George, Utah), 231
Society for Mining, Metallurgical and Exploration Engineers (SME), 124, 145, 455
Soil Conservation Service (Yerington, Nevada), 433
Sonoma Quicksilver Mine (Guerneville, California), 218-219
Sopp, George, 706
South Africa, 388-389, 393, 531, 550, 561
South America, 427
Southwood, George, 715
Soviet Union, 362
Spaniards, 143
Spanish Springs Valley (Sparks, Nevada), 304
Sparks High School (Sparks, Nevada), 239
Spectacular Shaft (Butte, Montana), 83
Spencer, L. B., 55
Spitzer, Bob, 295-296
Spokane, Washington, 371, 379, 404, 578
Spring City Mine (Nevada), 207
Spring Valley (Nevada), 251
Standard Mine (Pershing County, Nevada), 139-141, 147, 522, 524
Standard Slag Company, 74, 77-78, 80, 191
Stanford Lane Hospital (San Francisco, California), 51
Stanford Research Institute (Menlo Park, California), 353
Stanford University (Palo Alto, California), 521, 532, 548
Star Mine (Nevada), 315
Star Pointer Shaft (Ruth, Nevada), 427, 456, 459
Starded, Doctor, 702
Steamboat Hot Springs (Nevada), 340
Steinbeck, Charlie, 459
Steinheimer, Connie, 324
Steinheimer, Milt, 324
Steinmetz, Charles Proteus, 257
Sterling Mine (Beatty District, Nevada), 197, 558
Stewart Hall (University of Nevada, Reno), 48
Stewart, Jimmy, 128
Stillwater Ore, 242-243
Stoll, Harold, 279
Stormy Day Mine (Nevada), 315
Strawberry Tungsten Mine (California), 223
Strategic Materials Stockpile, 392-393
Stucker, Paul, 116
Stumpy, 23-24, 33
Sturdly, Fred, 273
Sucker Creek (Oregon), 263
Sugar House, Utah, 315
Sulfur, Nevada, 191
Sun Oil Company (Denver, Colorado), 256, 335
Sunbelt Mining Company, 197
Sunshine Mine (Coeur d'Alene, Idaho), 663
Sunshine Mine (Silver Peak, Nevada), 440-441, 445, 647
Sunshine Mining Company, 647
Superstition Mountains (Arizona), 688-689
Sutcliffe, Nevada, 85
Sutro Tunnel (Nevada), 286, 308
Swansea, Wales, 325

Swanwick Hall Grammar School (Ripley, England), 95
Swedes, 236
Swiss Oils of Canada, 412, 414-416, 418-420

T

T Lazy S Ranch (Nevada), 104-105, 109, 112-114, 413, 584-585, 612
Talapoosa Mine (Nevada), 197
Talcott, Neil, 323, 326
Tanganyika, Africa (Tanzania), 96, 123
Taranik, James V., 392, 527-528
Tavernia, George, 334
Taylor, Homer, 663
Telluride, Colorado, 319-320, 330, 606, 628
Texas Bureau of Economic Development, 389
Tham, Jack, 356
Thomas, A. B. "Blake," 102-103, 416
Thomas, Chic, 213-214
Thompson, Tommy, 532
Thorndycraft, Bruce, 202
Thorton, Charles Bates "Tex," 413
Tiechert Sand and Gravel (Sacramento, California), 250
Tiffany's (New York), 332
Tingley, Joe, 351
Tip Top Mine (Nevada), 296
Tom, Grover, 236
Tommy Knockers, 443
Tonawanda, New York, 635-636
Tonopah Air Base (Nevada), 55, 475
Tonopah and Goldfield Railroad, 577
Tonopah Extension Mine (Tonopah, Nevada), 54
Tonopah King Mine (Nevada), 647
Tonopah Mining Company, 639, 650, 703
Tonopah, Nevada, 28, 38, 78, 81, 267, 309, 335, 348, 401, 439, 466-468, 545, 574, 636, 699-702, 706
Touhy, Don, 271
Tramp Mine (Haley, Idaho), 657, 662
Traynor, Leonard, 321-322
Treweek, Clemmie, 115, 132-133, 554, 585
Treweek, Harry, 100, 102, 104, 106, 115, 132-134, 141, 537, 554, 556, 585, 589, 600, 616
Trudeau, Joseph Phillippe Pierre Yves Elliott, 412-413
Truman, Harry S., 403
Tuolumne River (California), 250
Turner, Paul, 489

Tuscarora Range (Nevada), 116, 125, 141
Twenty-Seventh Division (U.S. Army), 574-575
Twin Lakes Resort (Bridgeport, California), 496
Tybo, Nevada, 703, 715

U

U.S. Air Force, 222, 223
U.S. Air Force Aviation Cadets, 216
U.S. Atomic Energy Commission, 352, 355, 360, 362
U.S. Bureau of Land Management (BLM), 91, 126, 189, 235, 250, 261, 372, 485, 533, 536, 557-558, 560, 594-595, 612, 668-670, 679, 686, 696
U.S. Bureau of Mines, 55, 58-59, 157-159, 163-164, 198-200, 202, 209, 213, 235, 238-243, 245-246, 248, 253, 262, 330, 350-351, 358-359, 361, 363-364, 368-370, 372-373, 376, 378-379, 381-392, 400, 412, 418, 451, 458, 476, 483, 504, 507, 530, 532-533, 545, 559, 630
U.S. Bureau of Reclamation, 362, 373, 391
U.S. Bureau of Standards, 386
U.S. Congress, 371, 380, 382-383
U.S. Department of Agriculture, 188
U.S. Department of Defense, 394
U.S. Department of Energy, 241, 353, 357, 365, 368, 372
U.S. Department of Labor, 241, 368
U.S. Department of the Interior, 374-376, 385
U.S. Department of War, 475-476, 505
U.S. Environmental Protection Agency (EPA), 75, 227, 247, 362-363
U.S. Forest Service, 188-189, 535
U.S. Geological Survey (USGS), 98, 103, 230, 241, 262, 340, 349-352, 363, 372, 414, 422, 451, 467, 470, 503, 505, 507, 531-533, 548, 610, 630
U.S. Smelting, 315
U.S. War Production Board, 216
Udall, Morris King "Mo," 383
Union Carbide Company, 217, 222, 229, 234, 239, 297
Union Oil (Tonopah, Nevada), 702
Unionville, Nevada, 226, 323-327, 330, 397
United Engineers, 341-342
United Park City Mine (Utah), 310
United Siscoe, 170

University of Idaho (Moscow), 347
University of Nevada, Reno, 47-48, 67, 78,
217-218, 220, 239, 270, 331, 361, 392, 400,
404, 463, 472, 484, 511
University of Washington (Seattle), 333-334
Upper Peninsula (Michigan), 452, 481, 485,
508-509, 511
Ural Mountains (Russia), 408
Uriola, Steve, 617
Utah, 343-344, 362-363, 370

V

VEK Associates, 497, 514
VEK/Andrus Associates, 515-516, 519
VJ Day, 576
Valasquez, Ernie, 710
Valente, Johnny, 6, 13
Valley View Mine (Nevada), 296
Valmy, Nevada, 330, 584, 608
Vandenberg, William, 350
Vanderburg, Mr., 99, 121, 139, 141-142, 147
Vanegez, Juan, 704
Vaughn, Otis, 426, 455
Ventures Limited, 61
Victory Village "Fertile Valley" (University of
Nevada, Reno), 337
Villa, Pancho, 72
Virgin Shaft (Copper Canyon Mine), 82-84,
281, 297-298
Virginia and Truckee Railroad (V&T), 495
Virginia City, Nevada, 26, 38, 49-51, 206, 226,
233, 263, 267, 286, 303, 307, 338, 340, 422,
468, 512, 658
Virginia Polytechnic Institute (Blacksburg,
Virginia), 394
Vucanovich, Barbara, 384
Vucanovich, George, 384, 401

W

Wabuska, Nevada, 452
Wadzagar, Pete, "Haywire Pete," 6-7
Walker Lake (Nevada), 474
Walker, Owen, 18
Wallace, Andy, 515-516, 526
Walton, Doc, 210-211
War Production Order L208, 216-217, 328
Wark, Carlos, 212
Warner, John, 382-383
Warren, Don, 206

Warren, Norm, 389
Warren, Robert, 190
Warren, S. Power, 433-434, 438, 440, 448-449
Washoe County (Nevada), 397
Watkins, Sport, 7
Watt, James Gaius, 358, 371-376, 379, 383,
390
Watts (Los Angeles, California), 425
Waugh stoper, 309
Wayne, Jim, 644
Weaver, James H., 384
Webb, John S., 96, 118
Wedekind Mine (Sparks, Nevada), 303-304,
465
Weepah Mill (Tonopah, Nevada), 448
Weepah Mine (Tonopah, Nevada, 321-323
Weepah, Nevada, 52, 69, 321, 327, 330
Weinberger, Casper, 375
Wells, John, 493
Welsh, William, 79-80
West Coast Mine (Winnemucca, Nevada), 521
West, Perry, 116
West Virginia, 390
Western Federation of Miners, 263
Western States Mining Company, 416, 419,
421
Westgate Mill (Nevada), 468
Westside (Las Vegas, Nevada), 401
Wheat, Margaret "Peggy" (née Hatton), 474,
499
Wheeler, Harry, 282
White Caps Mine (Manhattan, Nevada), 54
White, Don, 340
White, Larry, 14-15
White, Mort, 100, 106, 109, 114, 137, 584,
589, 611
White, Sheila, 14
Whitford, Fred, 338, 340, 342
Wilderness Society, 404
Wildhorse Canyon (Custer County, Idaho),
228-229, 232, 239, 258
Wildhorse Creek (Idaho), 228-229
Willard, Clara, 496
Willard Mine (Nevada), 197
Willard, Pat, 49, 67-68, 70, 466, 482, 489,
492-493, 496
William and Heintz Map Corporation
(Washington, D.C.), 349
Williston, Sam, 256
Wilson, Jesse, 233
Wilson, Jim, 348

Wilson, Thomas, 77
Wimberly, Ray, 34-35
Wingfield, George, 26-28, 211, 257, 396-397
Winn, Howard, 189
Winnemucca High School (Winnemucca, Nevada), 328, 334, 400
Winnemucca Hotel (Winnemucca, Nevada), 402
Winnemucca, Nevada, 129, 187, 238, 242, 258, 292, 328-329, 400, 402, 464, 468, 521
Winters, Roy, 663-664
Wise, Alec, 295
Wise, Fred, 212, 219, 295
Wittenburg, Charles, 700, 702
Wonder Mine (Fallon, Nevada), 468
Woolman, Herman, 639-640
Wooster, Dave, 79
World War I, 208
World War II, 56-57, 69, 73, 216-217, 227-228, 235, 330
Wyoming Hotel (Pioche, Nevada), 6

Y

Yakutsk (Russia), 406
Yanacocha Mining (Peru), 187
Yarucocha Mine (Peru), 221
Yates, Sidney, 382
Yeltsin, Boris Nikolayevich, 405, 408
Yerington Mountain Copper Company, 211
Yerington, Nevada, 467, 470
Yuba Consolidated (California), 63
Yuba River (California), 242, 250, 259
Yucca Mountain (Nevada), 364
Yuma, Arizona, 669

Z

Zadra, Jack, 159, 238, 240-242, 246, 261, 369
Zadra Process, 159, 198, 238, 242
Zapatistas, 261
Zeiger, Dave, 368
Zortman, Montana, 173-174

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